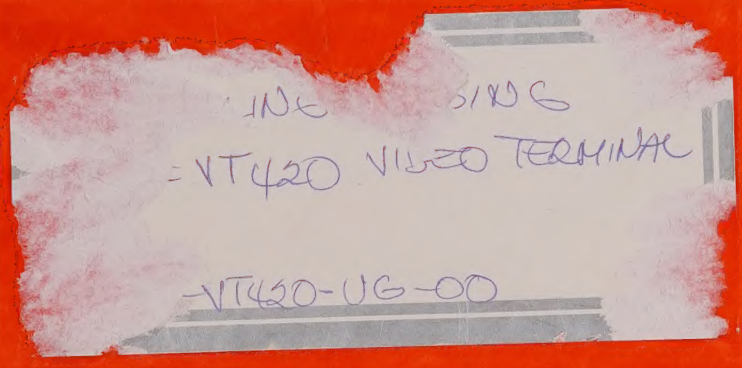
INC SING
=VT420 VIDEO TERMINAL
-VT420-UG-00

64180 ASE-I
Diagnostic Program Manual

Contents

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1. Overview

1.1 Purpose

The Diagnostic program checks HD64180ASE(H180AS01) hardware, and makes its maintenance easy when some problem occurs.

The Diagnostic program is provided by 3.5-inch floppy disk(S180TM01F).

When a problem occurs, execute the Diagnostic program according to "3, Operating Procedure", then let us know the detailed result. (Refer to chapter 5 for contact.)

1.2 Test System Configuration

Table 1-1 shows the required components when executing Diagnostic program. Also fig. 1-1 shows test system configuration.

Table 1-1 Test System Components

NO.	Components		Omission
1	ASE Station	Control board	Not omissible
		Trace board	Not omissible
		Emulation memory board 1	Omissible
		Emulation memory board 2	Omissible
2	Buffer Box		Not omissible
3	CRT (RS-233C Interface)		Not omissible
4	Printer (Centronics)		Omissible
5	Diagnostic program floppy disk		Not omissible
6	User system		Omissible

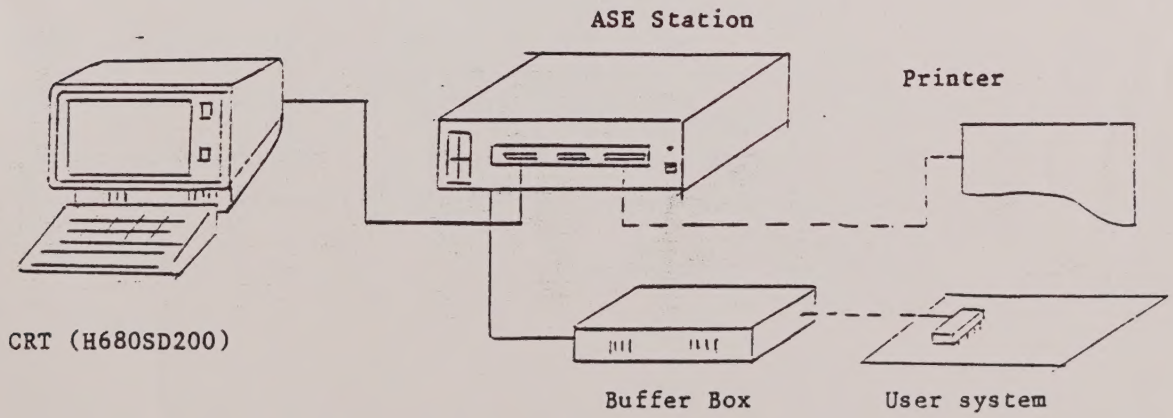


Fig. 1-1 Test System Configuration

2. Function

2.1 Outline

The Diagnostic program has two test system configurations and the user can optionally select either.

(1) ASE system test

The system configuration of this test is that in Fig. 1-1 excluding the user system. It tests ASE system alone.

Test result is displayed on CRT (printer by selection).

When starting the test, if there's no error, it becomes endless loop test without operator. However, if the printer is not connected, the test stops when an error occurs. If the printer is connected, when an error occurs, the test continues after printing.

You can make the following selection for the Diagnostic program.

(a) Test the emulation memory board or not
(b) Connect to a printer or not
(c) Test a floppy disk drive or not

(Note)

Be sure to disconnect the user system from buffer box when testing the ASE system alone.

(2) ASE + User system test

The system configuration of this test is that in Fig. 1-1 including the user system. The connected user system should have 4KB RAM from $2000.

The output of test result and the operation after starting the test are the same as (1) above.

You can make the following selection for the Diagnostic program.

(a) Test the emulation memory board or not
(b) Connect a printer or not
(c) Test a floppy disk drive or not.

2.2 Test Item

Table 2-1 shows test item of the Diagnostic program.
Test item is limited by testing system configuration.

Table 2-1 Diagnostic Program Test Item List

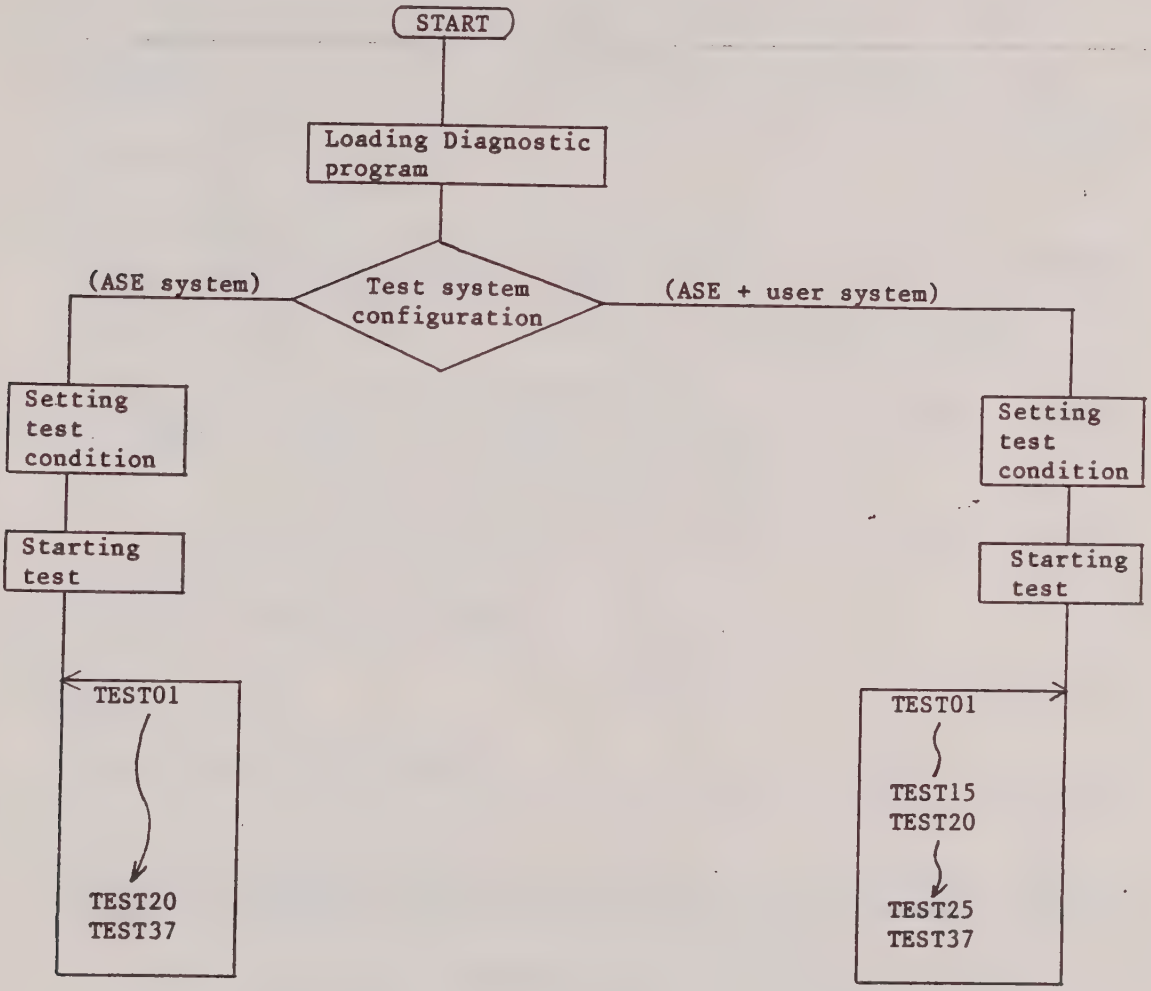
Test No.	Item	Description	System Configuration	
			No. 1	No. 2
TEST01	LOAD TEST	Loaded data comparison by checksum	○	○
TEST02	CONT RAM TEST	RAM test in control board	○	○
TEST03	CONT REG TEST	R/W test of registers in control board	○	○
TEST04	SHARED RAM TEST	RAM test in trace board	○	○
TEST05	ACV TEST	〃	○	○
TEST06	BM TEST	〃	○	○
TEST07	RAR TEST	READ/WRITE test of register in trace board	○	○
TEST08	TCR TEST	〃	○	○
TEST09	TBM TEST	RAM test in trace board	○	○
TEST10	BQR TEST	READ/WRITE test of register in trace board	○	○
TEST11	UAR TEST	〃	○	○
TEST12	BUF BOX CHECK	Transmit test (ASE station -- buffer box)	○	○
TEST13	FD TEST	3.5-inch FDD READ/WRITE test	△	△
TEST14	OPTION RAM TEST	RAM test of emulation memory board	△	△
TEST15	SU WINDOW TEST	READ/WRITE test of emulation memory in buffer box	○	○
TEST16	SU STEP TEST	STEP command test of emulation memory in buffer box	○	X
TEST17	SU RUN TEST	GO command test of emulation memory in buffer box	○	X
TEST18	SU BREAK TEST	TC command test of emulation memory in buffer box	○	X
TEST19	SU TRACE TEST	Trace test of program execution in emulation memory in buffer box	○	X

TEST20	REGISTER TEST	MPU internal I/O register check	○	○
TEST21	PU WINDOW TEST	READ/WRITE test of user system memory	X	○
TEST22	PU STEP TEST	STEP command test of user system memory	X	○
TEST23	PU RUN TEST	GO command test of user system memory	X	○
TEST24	PU BREAK TEST	TC command test of user system memory	X	○
TEST25	PU TRACE TEST	Trace test of program execution in user system memory	X	○
TEST37	PRINTER LOOP TEST	Printer interface loop test	△	△

* System Configuration
  No.1: ASE system test
  No.2: ASE + user system test
  ○ : Executing any time without an operator
  △ : Executing as specified
  X : No execution

2.3 Operation Flowchart

Fig. 2-1 shows flowchart describing operation procedure of Diagnostic program.



*(1) Execute TEST13 with FD test specified.
(2) Execute TEST14 with emulation memory board test specified.
(3) Execute TEST37 with printer interface loop test specified.

Fig. 2-1 Diagnostic program operation flowchart

3. Operating Procedure

Procedure of operating Diagnostic program is as follows.

(1) Check to see it that the following components are correctly connected.
   (a) Connecting the ASE station to console (SD200)
   (b) Connecting the ASE station to the buffer box
   (c) Connecting the buffer box to the user system (in connecting to user system)
   (d) Connecting the ASE station to a printer

(2) Turn on the power supply.
   (a) Turn on the power supply of the console (SD200)
   (b) Turn on the power supply of the user system (in connecting user system)
   (c) Turn on the power supply of the ASE
   (d) Turn on the power supply of a printer (in connecting a printer)

The ASE executes self Diagnostic after power-on.
The self Diagnostic checks RAM or register in the ASE. For details, refer to "64180 ASE-I User's Manual 12.1 Self Diagnostics".

Table 3-1 ASE starting message

```
ASE MONITOR V1.0
COPYRIGHTED BY HITACHI, LTD. 1985.
TESTING
 RAM 0123
SYSTEM MEMORY TEST

 ASE SYSTEM MEMORY 0123 (&264KB)
```

(3) Loading Diagnostic program

Insert the floppy disk (S180TM01F) including Diagnostic program into the floppy disk drive incorporated in the ASE and operates the following procedure.

Table 3-2 Loading Diagnostic program

```
START ASE
  S : START ASE
  R : RELOAD & START ASE
  H : HOST TERMINAL MODE
      (S/R/H)  ?  R (CR)

  SYSTEM LOAD
     H180AS01 TEST AND MAINTENANCE PROGRAM
         VER NO. = 1.00
```

(1) Character on the underline: to be input
(2) (CR) : RETURN key input.

(4) Select the test condition

When finished loading Diagnostic program, the following message is displayed on CRT, then key-in the test condition.

Table 3-3 Selection the test condition

```
PRINTER USING (Y/N)  ?  Y  CR ——————————————————————————— (a)
ERROR CONTINUE  OK (Y/N)  ?  N  CR ——————————————————————— (b)
PRINTER LOOP TEST OK (Y/N)  ?  N  CR ————————————————————— (c)
TEST MODE
  1. ASE ONLY
  2. ASE + FREE USER

MODE NO. = 2  CR ——————————————————————————————————————— (d)
USER RAM TOP ADDRESS = $02000 ————————————————————————— (e)
OPTION MEMORY EXIST (Y/N)  ?  Y  CR ——————————————————— (f)
OPTION MEMORY
   TOP ADDRESS = $8*0000  ?  0  CR ——————————————————— (g)
   END ADDRESS = $8*FFFF  ?  3  CR ——————————————————— (g)
FD TEST EXECUTE (Y/N)  ?  Y  CR ——————————————————————— (h)
   1. FD FORMAT          5. 55 AA R/W
   2. NORMAL SEEK        6. RANDOM DATA R/W
   3. SEEK TRACK ZERO    7. WORST PATTERN R/W
   4. RANDOM SEED        8. HEAT RUN (1-7 CONTINUE)
   TEST NO. (1, 2, 3, 4, 5, 6, 7, 8) = 8  CR ————————— (i)
START (Y/N)  ?  Y  CR ———————————————————————————————— (j)
```

[Description]

(a) Input if you use a printer or not.

(b) If you input "Y" (using a printer) at (a), this input requirement is displayed.
  N: When stops the test temporarily with an error occurred.
  Y: When continues the test with an error occurred.

(c) If you input "N" (using a printer) at (a), this input requirement is displayed. In this case, input "N".
However, when TEST NO. 31 PRINTER LOOP TEST is performed, input "Y".
Since the testing connector is required, refer to Appendix A for making it.

(d) Select the test mode.
1 : ASE system test
2 : ASE + user system test

(e) Displayed only when "2" is input at (d).

(f) Input if there is the emulation memory board.
Y : With emulation memory board
N : Without emulation memory board

(g) Input requirement is displayed only if "Y" is input at (f).
(1) One emulation memory board installed : 0 and 3
(2) Two emulation memory boards installed : 0 and 7

(h) Specify if floppy disk drive test is performed or not.

(i) The input requirement is displayed if "Y" is input at (h).
Input the test contents of a floppy disk. In this case, input 8.

(j) Inputting "Y" starts executing the test.
Inputting "N" returns the main title display of Diagnostic program.

(5) Execute Diagnotic program

The ASE executes Diagnostic program according to the flowchart shown in Fig. 2-1.

As far as an error does not occur, the message "OK" is displayed every test item execution shown in table 3-3.

Table 3-4 shows the case that the ASE system test is performed.

Table 3-4 Example of Diagnostic test (ASE system) printer output

```
        H180AS01 TEST AND MAINTENANCE PROGRAM
            VER NO.=1.00

        ERROR CONTINUE
        OPTION RAM = $800000 - $83FFFF
    FD TEST = ,,,8
    COUNT 0001 TEST 01  LOAD TEST                    OK
    COUNT 0001 TEST 02  CONT RAM TEST
    T&M AREA R/W TEST          OK
    FREE AREA R/W TEST         OK
    ASE STACK AREA R/W TEST  OK
    COUNT 0001 TEST 03  CONT REG TEST              OK
    COUNT 0001 TEST 04  TRACE RAM TEST1            OK
    COUNT 0001 TEST 05  TRACE RAM TEST2            OK
    COUNT 0001 TEST 06  TRACE RAM TEST3            OK
    COUNT 0001 TEST 07  TRACE REG TEST1            OK
    COUNT 0001 TEST 08  TRACE REG TEST2            OK
    COUNT 0001 TEST 09  TRACE RAM TEST4            OK
    COUNT 0001 TEST 10  TRACE REG TEST3            OK
    COUNT 0001 TEST 11  TRACE REG TEST4            OK
    COUNT 0001 TEST 12  BUFBOX CHECK               OK
    COUNT 0001 TEST 13  FD TEST                              *
        TEST8  3.5 FD HEATRUN TEST
        TEST1  3.5 FD FORMAT TEST                      OK
        TEST2  3.5 FD NORMAL SEEK TEST                 OK
        TEST3  3.5 FD SEEK TRACK ZERO TEST             OK
        TEST4  3.5 FD RANDOM SEEK TEST                 OK
        TEST5  3.5 FD 55,AA READ/WRITE TEST            OK
        TEST6  3.5 FD RDM DATA READ/WRITE TEST         OK
        TEST7  3.5 FD WORST DATA READ/WRITE TEST       OK
    COUNT 0001 TEST 14  OPTION RAM TEST1                     *
    OPTION RAM PAUSE TEST    OK
    OPTION RAM MARCH TEST    OK
    BOX RAM CHECK            OK
    COUNT 0001 TEST 15  SERVICE RAM TEST1
    SU SINGLE SEGMENT TEST  OK
    SU ALL SEGMENT TEST      OK
    BU SINGLE SEGMENT TEST  OK
    BU ALL SEGMENT TEST      OK
    COUNT 0001 TEST 16  TRACE TEST1                OK
    COUNT 0001 TEST 17  TRACE TEST2                OK
    COUNT 0001 TEST 18  TRACE TEST3                OK
    COUNT 0001 TEST 19  TRACE TEST4                OK
    COUNT 0001 TEST 20  MPU REGISTER TEST
    MMU R/W TEST                  OK
    I/O RELOCATION TEST           OK
    NON DELAY CYCLE TEST          OK
    SCVR CHECK                    OK
    HALT & SLEEP BREAK TEST       OK
    DMA BREAK TEST                OK
    ASCI TEST                     OK
    AT NO BREAK TEST              OK
    A18/TOUT TEST                 OK
    OPTION RAM DMA TEST           OK
    COUNT 0002 TEST 01  LOAD TEST                  OK
    COUNT 0002 TEST 02  CONT RAM TEST
```

[Description]

(a) Test Item Executing Times
(b) Test Item No.
(c) Test Item Name
(d) Test Result

* The tests are executed only when "Y" is input as key in the test condition described below. Inputting "N" gets started with the next test.

```
TEST 13  FD TEST
            FD TEST EXIST(Y,N)?
TEST 14  OPTION RAM TEST
            OPTION MEMORY EXIST(Y,N)?
```

4. Error Display

4.1 Display Format

Table 4-1 Display Format

Format	Example of Error Display	TEST NO.
1	COUNT xxxx TEST 01 LOAD TEST ... NG STATUS = xxxx ..... (1) ADDRESS = xxxxxx ..... (2) NORMAL DATA = xxxx ..... (3) ERROR DATA = xxxx ..... (4) [Description] (1) STATUS ; As for Error Status and the contents of Status, refer to section "4.2 Error Status". (2) ADDRESS ; The address where an error occurs. (3) NORMAL DATA ; Normal value data (4) ERROR DATA ; Error data In case of byte access data, the last order bytes are displayed by "*" as follows. xx**	TEST 1 to TEST 11 TEST 14, 15, 17, 18, and 20
2	COUNT xxxx TEST12 BUBOX CHECK ... NG STATUS = xxxx ..... (1) COMMAND = xxxxxxxx xxxxxxxx ..... (2) MESSAGE = xxxxxxxx xxxxxxxx xxxxxxxx ... (3) [Description] (1) STATUS ; As for Error Status and the contents of Status, refer to section "4.2 Error Status". (2) COMMAND ; The command sent from Control board to Buffer box.The first 8 letters shows the sort of command, and the last 8 shows the message size. (3) MESSAGE ; The answer from Buffer box to Control board. The first 8 letters shows the return code, the middle 8 shows the message size. The last 8 letters shows the the following: In case of ROM Error : Check sum value In case of RAM Error : Address of an error occurring Other cases : Unspecified	TEST 11 to TEST 20
3	COUNT xxxx TEST LOOP TEST ... NG LOOP COUNTER OK? NG STATUS = xxxx ..... (1) [Description] (1) STATUS ; As for Error Status and the contents of Status, refer to section "4.2 Error Status".	TEST 11 to TEST 20

4.2 Error Status

The Error Status shows the parts where something wrong occurs most often, according to the errors found by the Diagnostic program.

The wrong parts are divided by the Error Status as follows:

```
1000        ----- Control board error (H180CONT01)
2000        ----- Trace board error (H680AS02T)
3000        ----- Buffer Box error
4000        ----- Emulation memory board error (H680SM01S)
5000        ----- Concerning User system
Error Message ----- Concerning floppy disk driver
```

The following is the details of Error Status information.

(1) Error Status information in Control board

Table 4-2 Error Status information in Control board

Error Status	Contents	TEST NO.
1001	The Diagnostic program check sum error	1
1002	RAM R/W error in Control board	2
1003	EMRQ signal not negated.	3
1004	MONITOR REGISTER 2 check error	3
1005	CBR R/W error	3
1006	CMPXR R/W error	3
1007	CSTR bus error bit is not "1".	3
1008	CSTR no memory bit is not set.	3
1009	ECR R/W error	3
1019	Printer interface status error	37
101A	Printer interface interrupt error	37

(2) Error Status information in Trace board

Table 4-3 Error Status information in Trace board

Error Status	Contents	TEST NO.
2001	SHARED RAM R/W error	4
2002	BREAK RAM R/W error	6
2003	ACV R/W error	5
2004	RAR R/W error	7
2005	TCR R/W error	8
2006	TBM R/W error	9
2007	BQR R/W error	10
2009	Emulation memory board R/W error	15
200A	Emulation memory board address error	15
200B	Emulation memory board mapping error	15
200C	Trace data check error	16 to 25
200D	Status error in time of BREAK	16 to 25
2015	SHARED RAM mapping error	4

(3) Error Status information in Buffer Box

Table 4-4 Error Status information in Buffer Box

Error Status	Contents	TEST NO.
3001	EMRQ time out	11 to 25
3002	Time check error in program executing	11 to 25
3003	Buffer Box message error	11 to 25
3004	CBR BREAK bit error	11 to 25
3005	Time out occurs in program executing	11 to 25
3007	Write protect error	18
3108	UAR R/W error at refresh inhibition mode	11
3208	UAR R/W error at refresh enable mode	11
32F8	UAR R/W error at long refresh cycle	11
3D01	MMU R/W error	20
3D22	I/O relocation error	20
3D23	SCVR check error	20
3D25	Data error at DMA transfer	18
3D26	Address error at DMA transfer	18

(4) Error Status information in Emulation memory board

Table 4-5 Error Status information in Emulation memory board

Error Status	Contents	TEST NO.
4001	Emulation memory board mapping error	14
4002	Emulation memory board R/W error	14

(5) Error Status information concerning User system

Table 4-6 Error Status information concerning User system

Error Status	Contents	TEST NO.
5001	User system memory R/W error	21

(6) Error Message concerning floppy disk driver

(a) FDC COMMAND = xxxx
•FDC command error

(b) FDC RESULT STATUS ERROR
•FDC result status error

(c) FDC COMMAND WRITE ERROR = xx
FDC STR (RQM, DIQ NDM,CB, D3B D2B, D1B, D0B) = xx
•FDC command write error

(d) FDC DATA REQUEST WAIT TIME OUT ERROR
•Time out error occurs when waiting DATA REQUEST.

(e) FDC INTERRUPT WAIT TIMEOUT ERROR
•Time out error occurs when waiting INTERRUPT.

(f) FDC STATUS INPUT ERROR = xx
FDC STR (RQM, DIQ, NDM, CB, D3B, D2B, D1B, D0B) = xx
•FDC status error

(g) FDC IRQ INTERRUPT ERROR
•Time out error occurs when waiting index hole INTERRUPT.

(h) COMPARE ERR READ ADDRESS = tt hh aaaa
WRITE DATA = xx
READ DATA = xx
•The read data in byte No."aaaa" of tt-truck on hh-head is different from the write data.

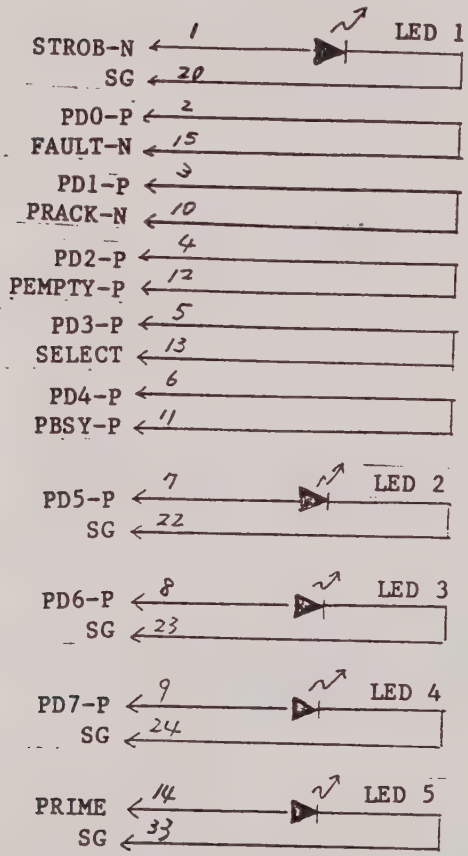
5. Error Servicing

If errors occur, assure the items described below, and let the sales agency know the details of error messages.

(1) The connection of ASE Station and ASE Buffer Box is normal?
(2) The connection of ASE Buffer Box and User system is normal?
(3) The emulation memory board is installed right?
(4) In case of the errors concerning User system,check again that it does not have any problems in user system.

< Appendix A > Repair circuit for PRINTER LOOP TEST
(TEST NO 37)

Make loops at the connector for PRINTER on the former panel of the ASE Station.



When displayed "WRITE = FF" on CRT in TEST 37, make sure of LED 1 to 5 lighting.

JANUARY 6 , 1986

ATTN :

HAL-SJ	Mr. T. Moroyan(*)	HITEC-UK	Mr. M. Trowbridge
	Mr. S. Thakur		Mr. J. McCulloch
	Mr. J. Fleury		Mr. T. Hosoi
	Mr. S. Imsen	UK DESC	Mr. N. Simpson(*)
	Ms. S. Holland		Mr. N. Tsujii
	Mr. B. Merritt	HITEC-HK	Mr. K. Y. Yung(*)
	Mr. A. Nagase		Mr. T. Ohshio
	Mr. S. Ohga		Mr. S. Urakawa
HMSI	Mr. D. Yeung(*)		
	Mr. K. Nomiya	HITEC-AS	Mr. L. Li(*)
	Mr. D. Pointer		Mr. T. Matsuzaki
HITEC-EU	Mr. W. Heer(*)	Nissei-Tokyo	Mr. Fujimaki(*)
	Mr. H. D. Bosch		Mr. Matsukuma
	Mr. M. Watanabe		
	Mr. T. Watanabe		

CC: Mr. Hirose / XG-1, Mr. Tomaru / XG-2, Mr. Wakabayashi / XG-3
Mr. Tatsuo - Mr. Morii / XG-4, Mr. Kumada / XG-5
Mr. Iwamoto / SICD-KAIGI

FROM : K. Sato , T. Watanabe / SICD-SP Gr.

RE : MICROCOMPUTER TECHNICAL INFORMATION
(SYSTEM IMPROVEMENT INFORMATION)

Attached please find the Microcomputer Technical update
1. Countermeasure of $\overline{WR}$ Signal Delay for your file.

To gentlemen (*) who have responsibility to distribute this informatoion to your organization: PLEASE ACKNOWLEDGE OF RECEIPT OF THIS INFORMATION BY SIGNING BELOW AND RETURN THE COPY TO SICD-SPGr.
** PLEASE SEE ATTACHED SERIAL NUMBER LIST **

Thank you in advance.

Kazu Sato — T. Watanabe

K. Sato — T. Watanabe

- Cut Here - - - - - - - - - - - - - - - - - - -

Attn: S. Kimura/SICD-SPGr

From _____

MICROCOMPUTER TECHNICAL INFORMATION ACKNOWLEDGEMENT

1. Countermeasure of $\overline{WR}$ Signal Delay

ACKNOWLEDGEMENT SIGNATURE _____ DATE _____

Serial Number List

HAL-SJ	Serial No. 50~54, 56, 58~61, 73~87 Total 25 systems
HITEC-UK	Serial No. 66~67, 117 Total 3 systems
HITEC-EU	Serial No. 68~72, 113~116 Total 9 systems
HITEC-AS	Serial No. 118 Total 1 systems

** PLEASE INFORM THIS INFORMATION TO THE CUSTOMERS WHO USE UPPER SERIAL NUMBER SYSTEMS.

顧客提出不可

DESIGN | INSPECTION | MCM 60.12.- | SALES OFFICE | OVERSEAS SALES OFFICE

PARTS NO. (FULL-ASSEMBLY NO.)	180AS01	REV. NO.	ABCDEF ABCEF	SUB-ASSEMBLY NO.		REV. NO.	

CLASS (CIRCLE)	A:SYSTEM DOWN B:NO SYSTEM DOWN ©LEVEL UP	DATE	ISSUE NO.
		'85 1-1 07	

OLD REV. NO. OF FULL-ASSEMBLY NO.	ABC ABCD	SERIAL NO. OF FULL-ASSEMBLY NO.	0042-0054, 0056, 0058-0072 0073-0097, 0113-0118
OLD REV. NO. OF SUB-ASSEMBLY NO.	-	SERIAL NO. OF SUB-ASSEMBLY NO.	----

DRAWING NO. OR (WORK SPEC NO.)	NAME (SPEC NO.)	DRAWING NO. (WORK NO.)	REMARKS	NAME (SPEC NO.)	DRAWING NO. (WORK NO.)	REMARKS

WORKING TIME FOR	REPAIR	INSPECTION

METHOD OF CONFIRMATION

1. CHANGED PART

There is no problem unless the circuit latching the $\overline{WR}$ signal at the falling edge of ϕ is used, so check the customer's using method.
Note that we shipped the revised version from October, '85. Please check to see it that the revised version has the above serial No.

1. INFLUENCE TO OTHER PART

The customer list with serial No. is attached.

REMARKS

図面の左半分は本変更の対象となる顧客に提出して下さい。
UBMIT THE ~~LEFT SIDE OF THIS SHEET~~ PREVIOUS SHEET TO THE CUSTOMERS WHO ARE APPLIED TO THIS REVISION.

訂正 EDITION		DESIGN			INSPECTION			REVISION WORK SHEET
	. .	DWN.	K.NAGASE	85.11.11	CONF.	M.Kawauchi	85.11.14	Hitachi, Ltd. MUSASHI WORKS 064
	. .	CHKD.	K.HOMMA	85.11.12	APPD.	J. Nishina	85.11.14	
	. .	APPD.	N. ITO	85.11.13			. .	

システム改善説明書
SYSTEM IMPROVEMENT INFORMATION

Hitachi, Ltd
MUSASHI WORKS

PARTS NO.(FULL-ASSEMBLY NO.)	H180AS01	SUB-ASSEMBLY NO.	—	REMARKS	0001E

Countermeasure of $\overline{WR}$ Signal Delay

THE REASON FOR CHANGE

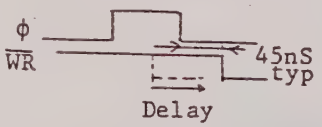
In the H180AS01, note that output timing of $\overline{WR}$ signal delays compare to that of actual device because of write protect.

1 When ϕ is 6MHz, the delay is the same as that in device specification.

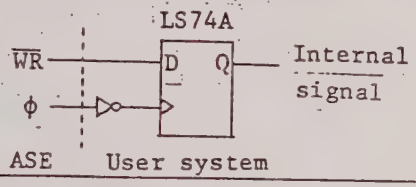
2 When ϕ is 4MHz, because the delay is more than that in device specification, the $\overline{WR}$ signal does not work correctly in the following case:

- The circuit latching the $\overline{WR}$ signal at the falling edge of ϕ is used.

There is no problem unless the circuit latching the $\overline{WR}$ signal at the falling edge of ϕ is used.



(Ex.)



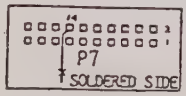
THE CONTENTS OF CHANGE

1. There is no problem unless the circuit latching the $\overline{WR}$ signal at the falling edge of ϕ is used.
2. If the $\overline{WR}$ signal is latched at the falling edge of ϕ, the following modification is required.

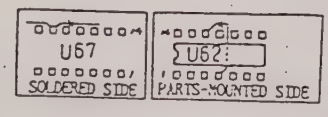
For repair, contact our sales agent.

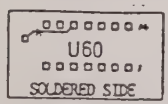
1)PATTERN CUT

a) PCB BBOX0



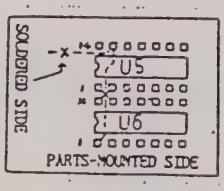
b) PCB BBOX1



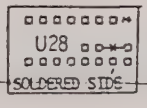


C) PCB BBOX2

U5-9 ✕ U7-12
P7-14 ✕ U20-6
P7-56 ✕ U5-10
P7-11 ✕ U6-12



d) PCB H680AS02T



2)JUMPER WIRING

a) PCB BBOX0

U8-11 ~ U58-10
U58-9 ~ U17-10
U58-8 ~ U34-13
U34-12 ~ P7-12

b) PCB BBOX1

U60-10 ~ U59-10
U67-12 ~ U62-10
U18-10 ~ U62-9
U62-8 ~ P7-14
U45-17 ~ U52-4
U67-9 ~ U50-13

C) PCB BBOX2

U5-9 ~ P7-12
U20-6 ~ U21-12
U5-10 ~ P7-14
U6-1 ~ U29-9 ~ U30-2
P7-11 ~ U51-5
U51-4 ~ U5-10
U51-6 ~ U6-12
U30-18 ~ U30-4
U30-16 ~ U30-6
U30-14 ~ U30-8
U30-12 ~ U5-13
U30-1 ~ U30-10

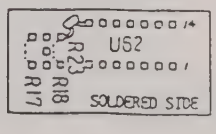
d) PCB H680AS02T

U28-2 ~ U28-7

3)Others

a) Replace C26 with 4700PF

b) Place R23:RE35YQ1KΩF as shown below.



⑦ After removing P9, take off the buffer box 0 by the same procedure as ⑥.

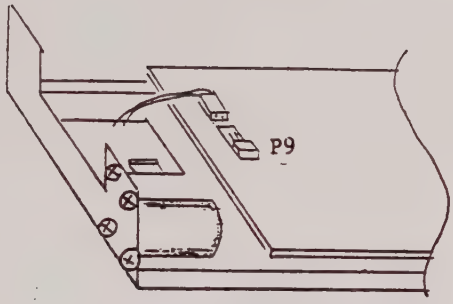


Fig. 2-34 Board Removal

The procedure of installing the boards is as follows.

a Install the boards according to the reverse procedure of removing the boards.
b In the step ⑤, be sure of the upper and lower sides of three cable shields in contact with each clasps.

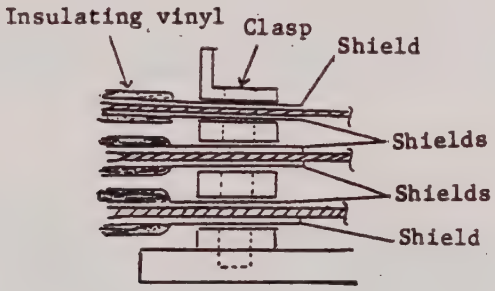


Fig. 2-35 Shields of ASE-Buffer Box Cables

c In the step ③, connect J1 cable to the buffer box board 2, J2 cable to the buffer box board 1.

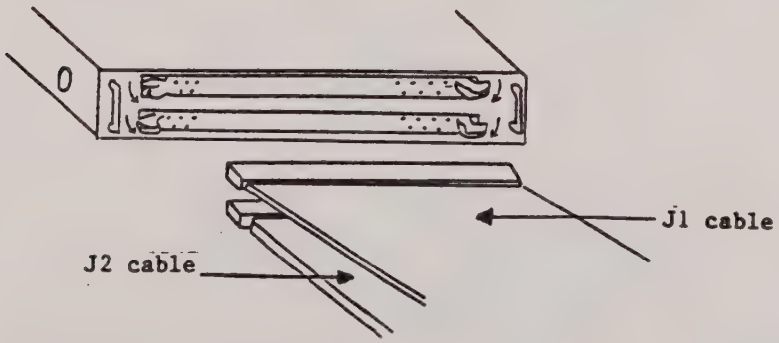


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Fig. 2-36 Connecting User System Interface Cable to Buffer Box

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The procedure of removing the fan unit and the fan unit board is as follows.

a Remove the boards according to the procedure ① to ⑦ .

b Remove the connector between the fan unit board and the fan unit, then remove the screws and the board.

c Remove the screws fixing the fan unit with 6 mm wrench and Phillips screwdriver, then remove the fan unit.

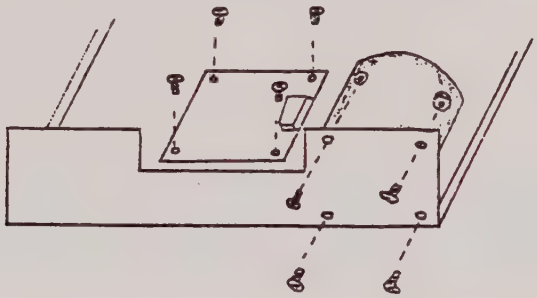

Fig. 2-37 Fan Unit Removal

The procedure of mounting the fan unit and the fan unit board is as follows.

Take the reverse procedure of removing the fan unit and the fan unit board. Take enough care not to damage the fan unit by a wrench.

2.3.3.3 MPU connector

Connecting MPU connector on the user system with 64-pin MPU IC socket of the user system enables HD64180 resided in the buffer box to operate instead of the MPU. Protection socket is applied to the MPU connector for protecting the pins. The procedure of removing MPU connector is as follows.

① Remove two screws and remove the cover ⓐ and ⓑ in that order.

② Disconnect the flat cable P12 and P11 in that order. Raise the connector little by little for both sides with a screwdriver.

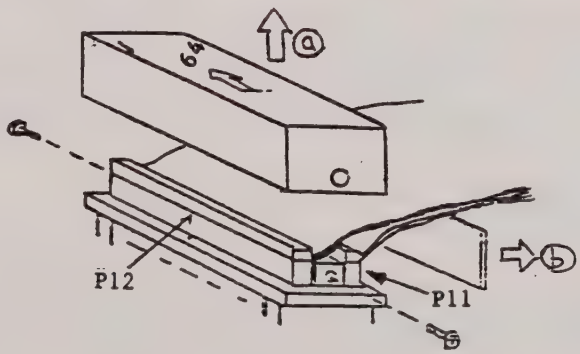

Fig. 2-38 MPU Connector Removal

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3. SYSTEM CONNECTION AND EXPANSION

This chapter describes the procedures of connecting the system and installing emulation memory borads.

3.1 Outline

The ASE has various system configuration as shown in the section "2.1 System Configuration".

(1) Stand alone (connecting only with a console)

(2) Connecting with SD200

(3) Connecting with general purpose host system

Connecting the ASE to any host system other than SD200 requires the user to apply proper interface specification. Also, it is possible to connect to a printer. However, connecting to the printer not recommended by Hitachi also requires the user to apply proper interface specification. And the ASE has two high-speed emulation memory boards to be installed. (256KB)

3.2 Connecting Power Supply Cable

The user should prepare AC receptacle (double-pole grounded type). Use the attached AC cable for connecting to the connector on the ASE station rear panel.

3.3 Connecting Signal Cables

3.3.1 Connecting with console

Serial interface is used for input/output operations between the ASE and the console. As shown in Fig. 2-9, there is the CRT connector on the ASE station front panel. This connector enables both RS-232C and TTL level connection. As for the pin assignment of the CRT connector, the interface selecting switch (RS-232C or TTL) and the baud rate setting switch, refer to the section "4.2 Connecting with Console" in "64180 ASE-I User's Manual".

3.3.2 Connecting with host system

Serial interface is used for input/output operations between the ASE and the host system. As shown in Fig. 2-9, there is the host system connector on the ASE station front panel. The interface is RS-232C level.

As for the pin assignment of the host system connector, refer to the section "4.3 Connecting with General Purpose Host System" in "64180 ASE-I User's Manual".

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3.3.3 Connecting with printer

The ASE is connected with the printer through centronics interface specification. As shown in Fig. 2-9, there is the printer connector on the ASE station front panel. Connect the ASE with the printer by this connector. The printer is to be prepared by the user.

As for the pin assignment of the printer connector and that on the printer, the recommended printer and the timing chart of the printer support software, refer to the section "4.4 Connecting with Printer" in "64180 ASE-I User's Manual".

3.3.4 Connecting with SD200

When connecting with the SD200, you do not have to think about CRT and HOST interface specifications. The connecting procedure is as follows.

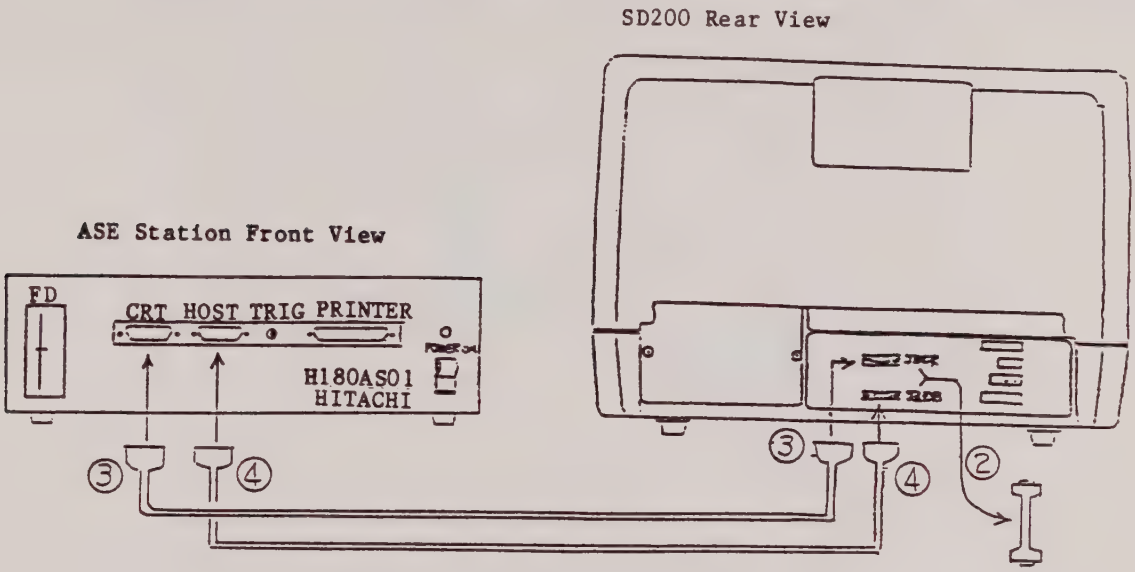

Fig. 3-1 Connecting with SD200

① With the ASE power and SD200 power OFF, disconnect the AC cable from the receptacle.

② Disconnect the cable between J3CR and J3DB on the back of the SD200 by removing 4 screws.

③ Connect CRT connector on the ASE station front panel with J3CR connector on the back of the SD200 by one of the two attached cables, and screw up the connectors.

④ Connect HOST connector on the ASE station front panel with J3DB connector on the back of the SD200 by the other cable, and screw them up.

3.3.5 Connecting with ASE buffer box

As shown in Fig. 2-6, the ASE buffer box is connected with the ASE by the ASE-buffer box flat cable. Below is described the connecting procedure.

① With the power OFF, disconnect the AC cable from the AC receptacle.

② Disconnect HOST, CRT and printer interface cables and the AC cable from the ASE station.

③ Draw the ASE station front panel toward you.

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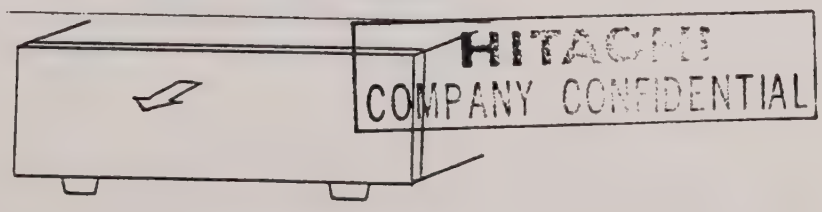

Fig. 3-2 Front Panel Removal

④ Insert the folded cable on the ASE station side to the case at the bottom of the ASE station. Ensure that the cable end is under the trace board connector.

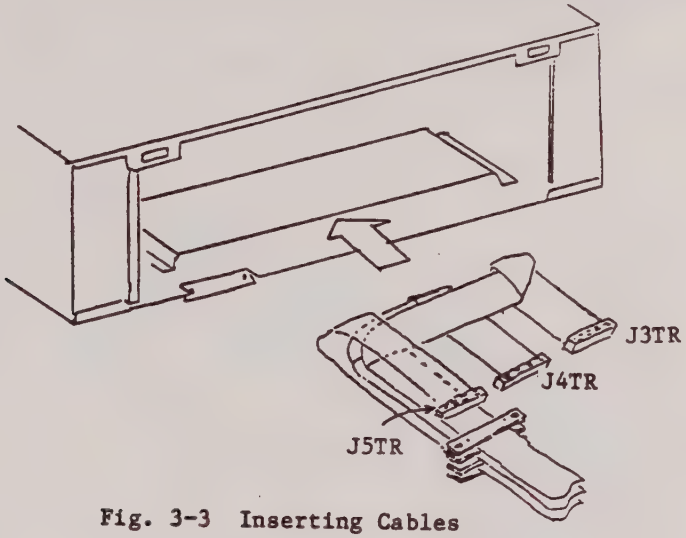

Fig. 3-3 Inserting Cables

⑤ Mount the cable clamp at the bottom left in the front of the ASE station.

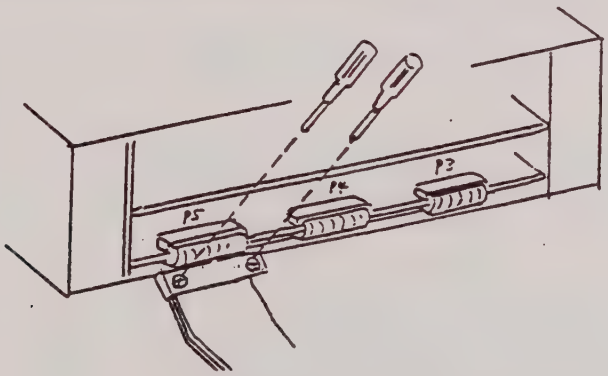

Fig. 3-4 Mounting Cable Clamp

⑥ Connect cables J3TR, J4TR and J5TR respectively to connectors P3, P4 and P5 on the trace board.

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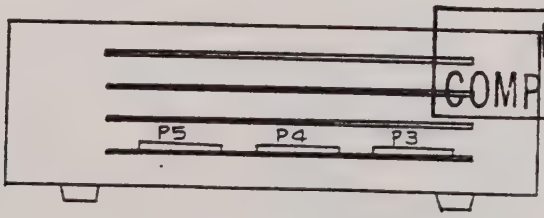

Fig. 3-5 Position of Connectors

⑦ Make sure again of the connection between each connector and cable.

⑧ Install the front panel.

3.3.6 Connecting user system interface cable

This section describes the procedure of connecting and disconnecting of the user system interface cable to and from the ASE station and the user system.

Fig. 3-6 shows the procedure of connecting the user system interface cable.

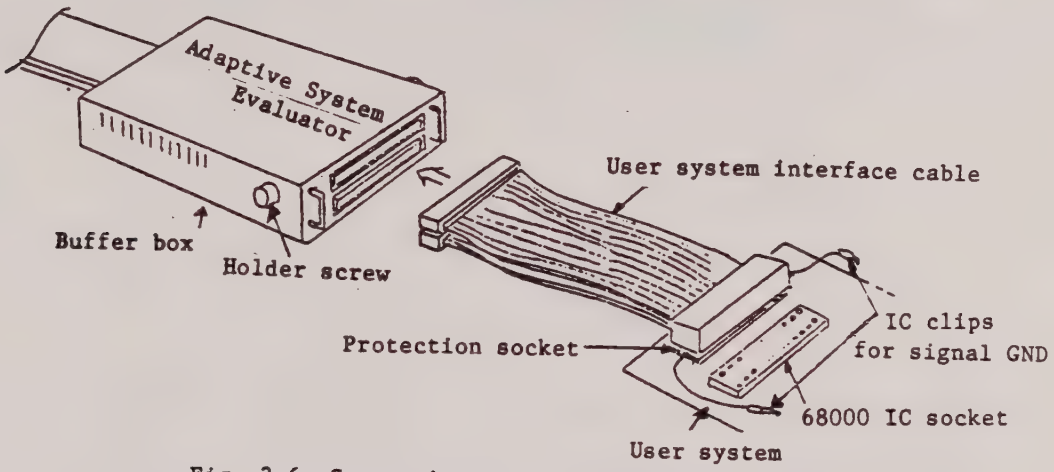

Fig. 3-6 Connecting User system interface cable

When connecting to the user system, check the MPU connector and MPU IC socket pin. As MPU IC socket, use IC83-64075G64 (produced by Yamaichi Electric Mfg. Ltd.) or equivalent.

Connect two GND IC clips to the user system GND. They are for GND reinforcement. Therefore, if not connected to them, the ASE might operate wrong.

The attached GND cable is also for reinforcement of GND between the ASE buffer box and the user system. Connect the holder screw of the ASE buffer box to the user system frame GND by this cable.

When removing this cable, take the reverse procedure of connecting. But disconnect it from MPU IC socket by raising little by little by a screwdriver.

Attached is the jacket for preventing external noise such as static electricity. If external noise causes wrong operation, put the jacket on the user system interface cable. The GND terminals of the jacket is connected to the holder screw on the buffer box and the user system GND. (Refer to Fig. 3-7.)

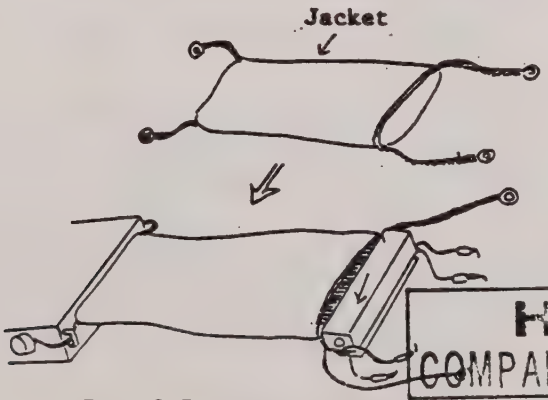

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Fig. 3-7 Jacket Connection

3.4 Connecting System GND Line

Connect the system GND line as follows.

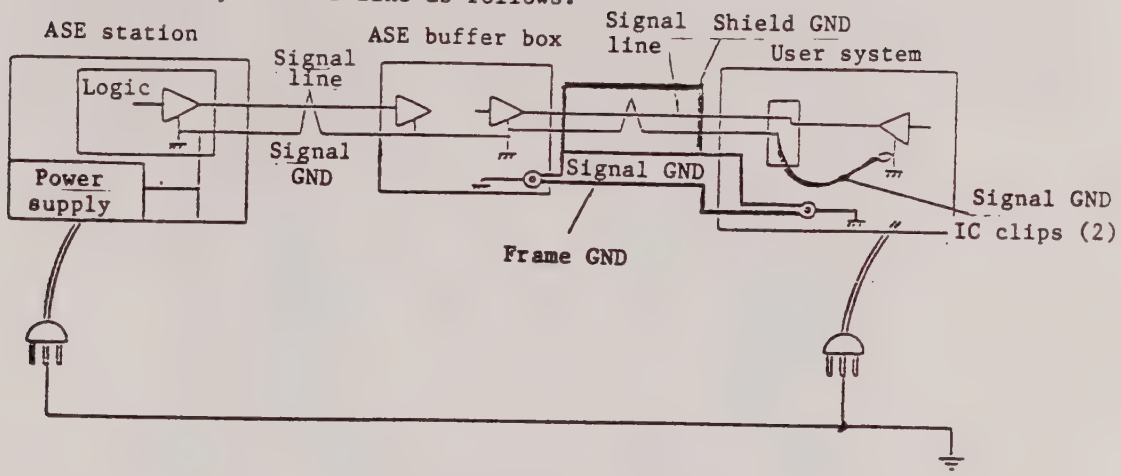

Fig. 3-8 System GND Line Connection

(Note 1) The signal GND and the frame GND are connected in the ASE station.

(Note 2) The signal GND in the buffer box is connected to the signal GND in the user system through the user system interface cable. The GND is reinforced by the GND IC clips of MPU connector.

(Note 3) In the user system, connect to not both the signal GND and the frame GND, but only the frame GND. When it is difficult to separate the frame GND from the signal GND, remove the same GND as frame GND of the 100V power supply.

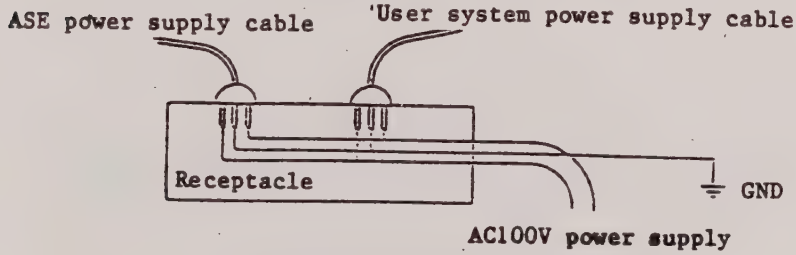

Fig. 3-9 Frame GND Connection

Connect the most suitable system GND and make the effect of noise and GND loop least. Connect the holder screw of the buffer box to the user system frame GND by the attached GND cable. Two GND IC clips from the MPU connector. Connect them to the IC GND around the MPU. They reinforce the GND between MPU and the user system.
Putting the attached jacket on the MPU connector causes the shield GND between the buffer box and the user system.(as shown in Fig. 3-8) This is for preventing external noise or radio wave trouble. As for the connecting procedure, refer to "3.2 Connecting MPU Connector".

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3.5 Emulation Memory Boards Installation

The ASE can have up to two high-speed emulation memory boards (H680SM01S) at user's option.
The memory board has the address setting switch. Set it as shown in Fig. 3-10. The first board address setting differs from the second board address setting. The address of the board has no relation to the address used as the user system memory. The "unused" switch in the figure may be set to either side.

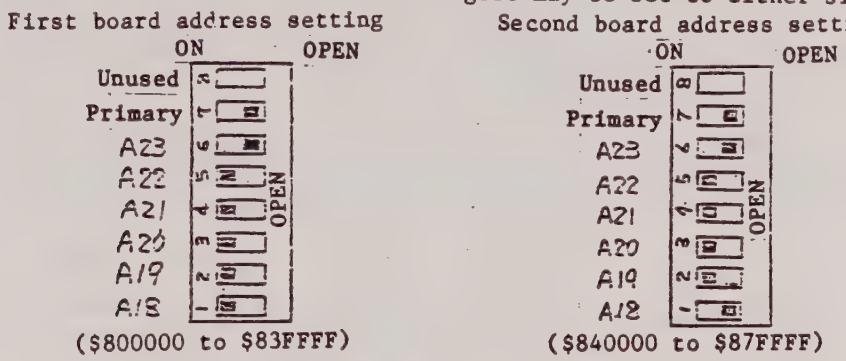

Fig. 3-10 High-Speed Emulation Memory Address Setting

The following shows the installing procedure of the emulation board.

① Make sure that the ASE power is OFF. Turn the host system, the console and the printer OFF.

② Disconnect the ASE station power cable from the power supply receptacle.

③ Disconnect the host system, the console and the printer interface cables from the ASE station.

④ Remove the front panel.

⑤ Check the address setting switch of the emulation memory board.

⑥ Insert the board in the first or third slot along the housing guides with the parts-mounted side up. Then set the card pullers with a memory board inside two supports, and force the board securely as holding card pullers by both hands. (Refer to Fig. 3-11.)

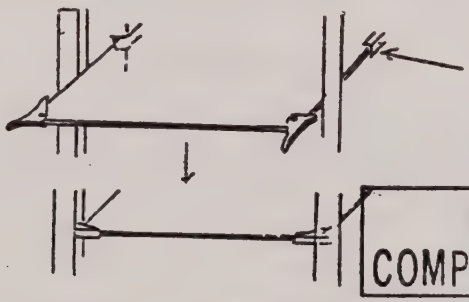

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Fig. 3-11 Inserting Board

⑦ Install the front panel.

⑧ Connect the host system, the console and the printer interface cables.

4. OPERATING CONDITION

4.1 Power Supply Condition

See the following table on power supply condition.

Table 4-1 Power Supply Condition

No.	Item	Condition	Remarks
1	Input voltage	Single phase AC100V to 120V ± 10% AC200V to 240V ± 10%	
2	Input frequency	49 to 61Hz	
3	GND		
4	Power consumption	0.3KVA	

4.2 AC Power Supply

The power supply is installed to the cabinet panel. As branch circuit switch, use no-fuse circuit breaker.

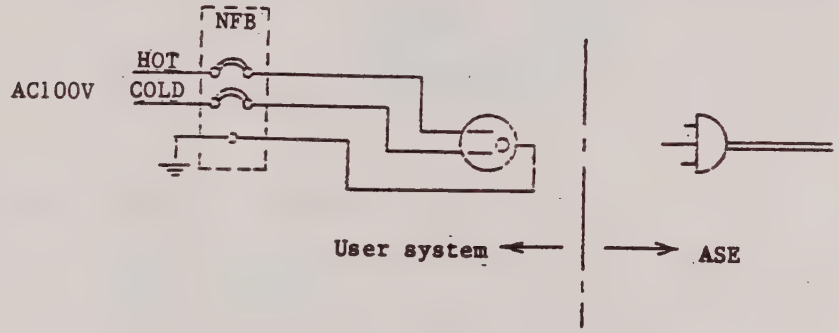

Fig. 4-1 Cabinet Panel Branch Circuit

As receptacle, use double-pole grounded type receptacle (125V, 15A) or equivalent.

4.3 Noise Prevention

The electric noise generated by the other apparatus may trouble the ASE, therefore, take care the following points

(a) Keep off other apparatus of generating electric noise.

(b) Do not connect other electric apparatus to the branch circuit of the ASE, or in the trouble of the other apparatus NFB operates and the ASE is in danger of down.

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4.4 Environmental Condition

Below are listed the environmental condition.

Table 4-2 Environmental Condition

No.	Item	Condition	Remarks
1	Temperature	Operating : 10 to 35°C Storage :-10 to 50°C	
2	Humidity	Operating : 35 to 80%RH (Without condensation) Storage : 35 to 80%RH (Without condensation)	
3	Vibration	Operating : Max. 0.25G Storage : Max. 0.5G During : Max. 1.5G delivery	
4	AC input	Voltage : AC100V to 120V ± 10% AC200V to 240V ± 10%	
	voltage	Frequency : 50/60Hz Power : 300VA or less consumption	
5	Ambient gas	No corrosive gas	

5. PRECAUTIONS AT MAINTENANCE

At maintenance, notice the following points to prevent the second trouble caused by wrong handling.

(1) On replacing parts or units, always turn the power OFF and then disconnect AC input cable power supply plug from the power supply receptacle.

(2) Do not lose the removed screws and washers on replacing parts.

(3) When carrying PCB, wrap it by conductive sheet and pack it with shock protecting package.
(Do not use aluminum foil.)

(4) After replacing and/or repairing, check not only the repaired part but also loose connectors, and then check its operation.

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6. MAINTENANCE PARTS

This chapter describes the ASE maintenance parts and the tools for replacement. Consumables like floppy disk are not included. As for the replacement procedure, refer to "2.3 Detailed Configuration and Its Description" and "3.5 Emulation Memory Boards Installation".

6.1 Maintenance Parts List

The ASE maintenance parts are listed on Table 6-1. The table lists them on an assembly basis. The sales office should keep a proper quantity of each part taking both Mean Time Between Failures (MTBF) and shipment quantity into consideration.

(1) Normally at the first lot shipment, one set should be stored in the maintenance department. Apply the stored parts such as cables to the user for maintenance.

(2) The item of the circled number in the list is the general maintenance part depending on the balance of MTBF and shipment quantity.

Table 6-1 ASE Maintenance Parts List

No	Part Name	Factory Abb. #	Part Code	Necessary Stocks per Product			Price		Lead Time
				1-10	11-30	31-100	** (yen)	( )	
1	CONT BOARD PCB ASSY	P180CNT01	G063400	1	1	2	343,000		E
2	TRACE BOARD PCB ASSY	P680AS02T	G057800	1	1	2	298,500		E
3	BOX BOARD 0 PCB ASSY	P180AS1B0	G063500	1	1	2	75,000		E
4	BOX BOARD 1 PCB ASSY	P180AS1B1	G063600	1	1	2	75,000		E
5	BOX BOARD 2 PCB ASSY	P180AS1B2	G063700	1	1	2	75,000		E
6	HS-MEN BOARD PCB ASSY	H680SM01S	G060500	1	1	2	293,000		E
7	SDIL MPU CONNECTOR	P180ASDI1	G063800	1	2	4	91,500		E
8	RS-232C(CRT) CABLE ASSY	P680CC02S	G058400	1	1	2	16,000		D
9	RS-232(HOST) CABLE ASSY	P680CH01S	G058500	1	1	2	16,000		D
10	PROBE CABLE ASSY	P680XPB1S	G058600	1	2	4	6,500		D
11	PR CABLE ASSY	P680CP02S	G058700	1	1	2	19,500		D
12	BOX CABLE ASSY	P680CBX1S	G058800	1	1	2	52,500		D
13	FAN ASSY	P680XFN2S	G058900	1	1	2	9,000		D
14	GROUND ASSY	P680XCL1S	G059000	1	1	1	8,500		D
15	POWER SUPPLY (For 100-120V)	P180P100S	G063900	1	1	2	57,000		D
16	POWER SUPPLY (For 200-240V)	P180P200S	G064000	1	1	2	57,000		D
17	P.S. LAMP UNIT ASSY	P680XLP1S	G059300	1	1	1	19,500		E
18	BACKPLAIN ASSY	P680BP01S	G059400	1	1	1	112,000		E
19	UL AC LINE CORD	P200CAC1S	G055800	1	1	1	7,000		D
20	CEE AC LINE CORD	P200CAC2S	G055900	1	1	1	7,000		D
21	BS AC LINE CORD	P200CAC4S	G056100	1	1	1	7,000		D
22	SDIL MPU IC SOKET	P180XDL1	G064100	1	2	4	5,000		D
23	FD CABLE	P180CF01	G064200	1	1	2	5,000		D
24	MICRO FDD	P180FDD1	G064300	1	1	2	80,000		D

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No	Part Name	Factory Abb. #	Part Code	Necessary Stocks per Product			Price		Lead Time
				1-10	11-30	31-100	** (yen)	( )	
25	DC FAN ASSY	P180XDF1	G064400	1	1	2	9,000		D
26	CONNECTION CABLE IN BUFFER BOX (1)	P180CBB1	G064500	2	2	4	8,000		D
27	CONNECTION CABLE IN BUFFER BOX (2)	P180CBB2	G064600	1	1	2	8,000		D

1) *: Refer to the price for each oversea office.
**: FOB Musashi Works

2) Lead Time: A - 1 month, B - 2 months, C - 3 months
D - 4 months, E - 5 months, F - 6 months

6.2 Maintenance Tools

Table 6-2 shows the tools needed for replacement or inspection of maintenance parts.

Table 6-2 Maintenance Tools

No.	Name	Application
1	Phillips screwdriver, large	Screw removal
2	Phillips screwdriver, medium	Screw removal
3	Phillips screwdriver, small	Screw removal
4	Screwdriver, large	Front panel removal
5	Screwdriver, medium	
6	Screwdriver, small	Voltage adjustment
7	Circuit tester Digital voltmeter	AC/DC voltage check
8	Isopropyl alcohl	Edge connector cleaning
9	Gauze	Edge connector cleaning
10	Soapsuds	External surface cleaning
11	Tweezers	Spare
12	Conductive bag	Board packing
13	CRT	ASE function check (User system)
14	PC831	ASE function check (User system)
15	Printer	ASE-printer interface check
16	Oscilloscope	Measurement of TRIG signal during T&M excecution
17	Box wrench (M3)	Fuse replacement on the cold line side
18	Power supply	PC831 power supply(5V, 10A)
19	H680SD200	Host system

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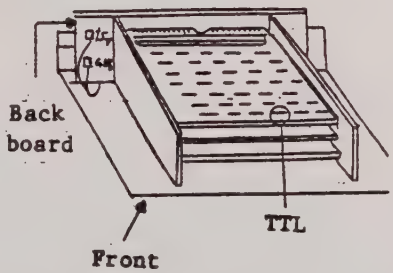
7. INSPECTION STANDARD

This chapter describes the checking items of the ASE inspection. For effective maintenance, check it according to its defective condition, working days and the user's own convenience on actual inspection and check. It is most preferable to inspect just before the expiration of free guarantee period (for one year after delivery). Table 7-1 shows the inspection standard. As for the procedure No. 3 and its following, refer to the section "9.4 T&M Operating Procedure".

Table 7-1 Inspection Standard

No.	Item	Standard	Description	Remarks
1	Cleaning	No dirt or dust	ASE station •Remove all dirt, dust and other unnecessary things. •Clean especially the air inlet, the fan and the air outlet. (Do not use organic thinner.)	
			Buffer box •Remove all dirt, dust and other unnecessary things from inside the buffer box.	
2	Power supply voltage check	AC power input voltage	Measure the power of the receptacle on the user side. Instrument : Digital voltmeter	
		DC power voltage	Set the DC power voltage of any board installed in the ASE for the +5V TTL located farthest from the +5V power supply to be +5V ± 1%. (on the front side of the ASE)  	
3	Load test	No errors with T&M	Compare checksum data to see that T&M program is loaded normally from 3.5 inch floppy disk to the ASE.	
4	CONT RAM test	ditto	Check the RAM and the peripheral circuit of the control board. (i) PAUSE test (ii) MARCHING test	
5	CONT REG test	ditto	Execute R/W test of the control board register.	
6	SHARED RAM test	No errors with T&M	Check the SHARED RAM and its peripheral circuit of the [illegible] board. (i) PAUSE test (ii) MARCHING test	

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No.	Item	Standard	Description	Remarks
7	ACV test	ditto	Check the RAM and its peripheral circuit used in the address converter (ACV). (i) PAUSE test (ii) MARCHING test	
8	BM test	ditto	Check the RAM and its peripheral circuit used in the break memory (BM). (i) PAUSE test (ii) MARCHING test	
9	RAR test	ditto	R/W check of the record address register (RAR).	
10	TCR test	ditto	R/W check of the trace control register (TCR).	
11	TBM test	ditto	Check the trace buffer memory (TBM) and its peripheral circuit. (i) PAUSE test (ii) MARCHING test	
12	BQR test	ditto	R/W check of the break quality register (BQR).	
13	UAR test	ditto	R/W check of the user address register (UAR).	
14	BUFFER BOX test	ditto	Check the buffer box operation by setting a command packet into the SHARED RAM.	
15	FD test	ditto	Check FDD for 3.5 inch floppy disk and its peripheral circuit. (1) DISK FORMAT test (2) SEEK test (3) SEEK TRACK 0 test (4) RANDOM SEEK test (5) 55, AA R/W test (6) RANDOM DATA R/W test (7) WORST PATTERN R/W test	
16	OPTION RAM test	ditto	Check the optional high-speed emulation memory board. (i) PAUSE test (ii) MARCHING test	
17	SU WINDOW test	ditto	R/W check by the WINDOW for emulation memory.	
18	SU step test	ditto	Check if the program in emulation memory is executed by STEP. Check the followings at every instruction execution. (1) RAR value (2) STM value (3) BSR value (4) TBM contents	
19	SU RUN test	No errors with T&M	Check RUN and BREAK functions in the program on emulation memory. (i) ALL BREAK test (ii) NO BREAK test (iii) ADDRESS BREAK test (iv) DATA BREAK test (v) COUNT BREAK test	

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No.	Item	Standard	Description	Remarks
20	SU BREAK test	ditto	Check the status and trace content at various breaks. (i) Normal break (ii) Forced break	
21	SU TRACE test	ditto	Check the trace function in the program execution on emulation memory.	
22	REGISTER test	ditto	R/W test of the MPU internal I/O register.	
23	PU WINDOW test	ditto	R/W check for the memory of actual user space.	
24	PU STEP test	ditto	Check the program in actual user memory is executed by STEP. Check the following at every instruction execution. (1) RAR value (2) STM value (3) BSR value (4) TBM contents	
25	PU RUN test	ditto	Check RUN and BREAK functions in the program on the user memory. The check points are the same as SU RUN test.	
26	PU BREAK test	ditto	Check the status and trace content at various breaks of the program executed on user memory.	
27	PU TRACE test	ditto	Check the trace function in the program executed on the user memory.	
28	PU SU CONTINUE test	ditto	Check the emulation by shifting program execution space continuously from the user memory to emulation memory, then back to user memory.	
29	CLOCK TRACE test	ditto	Check the trace data in the high-speed mode.	
30	TTL LOOP test	ditto	Check the TTL level port of the CRT interface.(Use the loop connector.)	
31	SWITCH test	ditto	Check the user system interface. (i) Reset input line (ii) Interrupt input line	
32	PROBE test	ditto	Check the external probe functions.	
33	BREAK KEY test	ditto	Check if a break occurs by pressing BREAK key on the CRT keyboard.	
34	OTHER LINE test	ditto	Check the user system interface during emulation. (i) BUS REQ (ii) INT 0,1,2	
35	CRES test	No errors with T&M	Check if pulses are output from the TRIG pin in cycle reset mode. (Use oscilloscope.)	
36	TRIG test	ditto	Check if pulses are output from the TRIG pin in trigger mode. (Use oscilloscope.)	

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No.	Item	Standard	Description	Remarks
37	USER RUN test	ditto	Check if it is normal operation during emulation of the user side firmware.	
38	NO CLOCK test	ditto	Check if the monitor senses the stop of the user clock and displays it.	
39	PRINTER LOOP test	ditto	Check if it is normal operation of the printer circuit.	
40	ASCIO & CSIO test	ditto	Check ASCIO, CSIO of the MPU and its peripheral functions.	
41	DREQ 0.1 test	ditto	Check DREQ 0 pin, DREQ 1 pin functions and its peripheral circuit.	

8. DIAGNOSTIC FUNCTION

The ASE has a test program to be executed at power on reset on the control board.

With the power ON, the ASE displays the following on the screen.

```
ASE MONITOR Vm.n                          ---------- ①
COPYRIGHTED BY HITACHI, LTD. 1985
TESTING
 RAM 01234                                ---------- ②
SYSTEM MEMORY TEST

 ASE SYSTEM MEMORY 01234  (256KB)         ---------- ③
```

① This is the starting message. Vm.n indicates the version number.

② Tests the ASE system RAM (256KB). Divides the RAM into five units and numbers 0 to 4 as follows.

0 ----- $0 to $FFFF
1 ----- $10000 to $1FFFF
2 ----- $20000 to $2FFFF
3 ----- $30000 to $37FFF
4 ----- $38000 to $3FFFF

③ Tests high-speed emulation memory (H680SM01S).
Divides the memory into four units by 64KB and numbers 0 to 3 (0 to 7 for two boards) as follows.

0 ----- $800000 to $80FFFF
1 ----- $810000 to $81FFFF
2 ----- $820000 to $82FFFF
3 ----- $830000 to $83FFFF
4 ----- $840000 to $84FFFF
5 ----- $850000 to $85FFFF
6 ----- $860000 to $86FFFF
6 ----- $870000 to $87FFFF

Displays the possible size for emulation in the last parenthesized part.

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Display at error

```
ASE MONITOR  Vm.n
COPYRIGHTED BY HITACHI, LTD. 1985.
TESTING
 RAM 012
 **RAM ERROR ADDR = $ΔΔΔΔΔΔ  W - DATA = xxxxxx  R - DATA = xxxxxx  ----------①

 SYSTEM MEMORY TEST

 ASE SYSTEM MEMORY 01                          (64KB)      ----------②
 **RAM ERR ADDR = $ΔΔΔΔΔΔ  W - DATA = xxxxxx  R - DATA = xxxxxx

 **CBR ERROR  W - DATA = xxxx   R - DATA = xxxx    ----------③
 **TCR ERROR  W - DATA = xxxx   R - DATA = xxxx    ----------④
 **BQR ERROR  W - DATA = xxxx   R - DATA = xxxx    ----------⑤
 **RAR ERROR  W - DATA = xxxx   R - DATA = xxxx    ----------⑥
 **TBM ERROR  W - DATA = xxxx   R - DATA = xxxx    ----------⑦
 **RAR//CLR   ERROR                                ----------⑧
```

① Result of RAM R/W check
Addresses $0 to $1FFFF are checked as OK.
At address $ WRITE data is not the same as READ data.

② Result of READ after WRITE check of high-speed emulation memory
At address $ WRITE data is not the same as READ data.
Therefore, addresses $800000 to $80FFFF (64KB) are available.

③ A data verify error occurs in R/W of CBR.

④ A data verify error occurs in R/W of TCR.

⑤ A data verify error occurs in R/W of BQR.

⑥ A data verify error occurs in R/W of RAR.

⑦ A data verify error occurs in R/W of TBM.

⑧ The 11th bit in RAR cannot be cleared.

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9. OUTLINE AND PROCEDURE OF T&M

The T&M checks the functions of the debugging system ASE, an option of the development system H680SD200, and facilitates its maintenance.

9.1 System Configuration

Fig. 9-1 shows the ASE test system configuration.

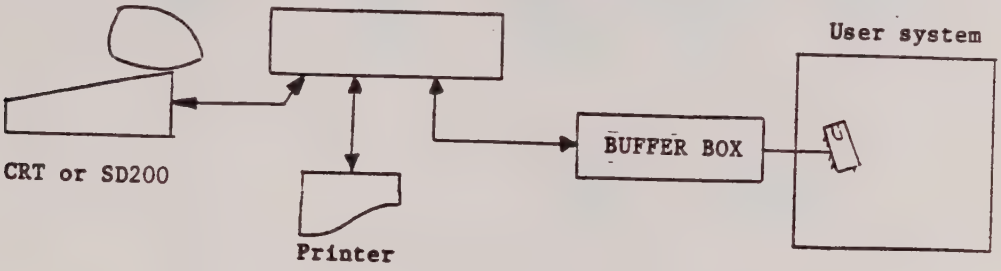

Fig. 9-1 Test System Configuration

As shown Fig. 9-1, operating the T&M requires the following equipments.

(1) SD200

(2) ASE station ----- Control board (H180CONT01)
Trace board (H680AS02T)
Optional memory board

(3) ASE buffer box

(4) User system ----- PC831 (Omissible, testing board included)

(5) Printer ----- Omissible

Test procedure
The T&M is written into 3.5 inch FD (supplied to the user through FD) and operates as follows.

(1) Loads the program.

(2) Executes the ASE test.

(3) Transfers the test result to CRT.

(4) Prints the test result

After (1), (2) (3) and (4) are repeated.

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9.2 Outline of T&M

The T&M can work in the following testing modes.

(1) Test only with ASE system (ASE ONLY TEST)

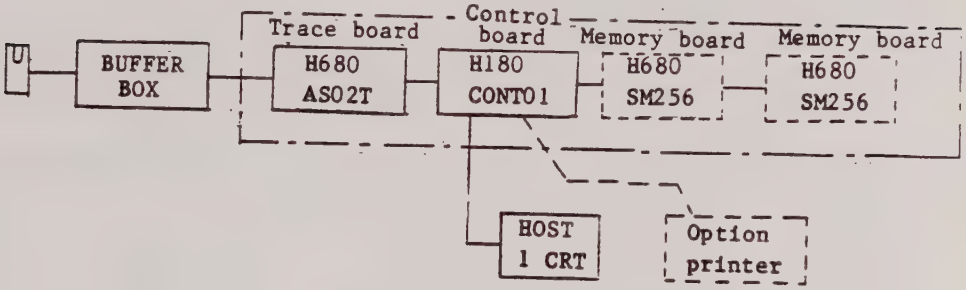

Fig. 9-2 ASE Only

The test does not require the user system. The test result is output to the CRT or the printer. (The printer is ommisible)
When the test begins, it becomes an endless loop test without any operator intervention, unless any error occurs. Without a printer any error stops the test, but with printer connected no errors stop the test.
The following optional specifications are available.

(a) Option memory (H680SM01S) test specification

(b) Print character specification

The test is supplied to the user. (Refer to User's Manual.)

(2) ASE system + User system (ASE + FREE SYSTEM TEST)

The test requires the user system, which has more than 1K byte RAM. The test result is output to the CRT or the printer. When the test begins, it becomes an endless loop test, unless any error occurs. With a printer connected no errors stop the test. The following optional specification are available.

(1) Option memory test specification

(2) Print character specification

(3) User system test range specification

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The test items are listed in Table 9-1.
The test consists of 39 items, however, the items are selected to execute by test mode.

Table 9-1 T&M Test Item List

No.	Item	General specification	Execution by test mode			
			ASE ONLY	ASE+FIXED	ASE+FREE	
1	LOAD TEST	Compare tansferred data	o	o	o	
2	CONT RAM TEST	Pause and marching test	o	o	o	
3	CONT REG TEST	R/W test of register in control board	o	o	o	
4	SHARED RAM TEST	Pause and marching test	o	o	o	
5	ACV TEST	ditto	o	o	o	
6	BM TEST	ditto	o	o	o	
7	RAR TEST	R/W test	o	o	o	
8	TCR TEST	R/W test	o	o	o	
9	TBM TEST	Pause test	o	o	o	
10	BQR TEST	R/W test	o	o	o	
11	UAR TEST	R/W test	o	o	o	
12	BUF BOX TEST	Test packet transmit check	o	o	o	
13	FD TEST	3.5 inch FD R/W check	o*	<--	<--	
14	OPTION RAM TEST	Pause and marching test	o*	<--	<--	
15	SU WINDOW TEST	R/W test	o	o	o	
16	SU STEP TEST	Trace data test after single-step	o	o	x	(Note 1)
17	SU RUN TEST	Trace data test after RUN	o	o	x	
18	SU BREAK TEST	Break function check	o	o	x	
19	SU TRACE TEST	Trace function check	o	o	x	
20	REGISTER TEST	MPU internal I/O register check	o	o	x	
21	PU WINDOW TEST	R/W test of user system memory	x	o	o	
22	PU STEP TEST	Single-step test of user memory	x	o	o	
23	PU RUN TEST	RUN test of user system memory	x	o	o	
4	PU BREAK TEST	Break function check of user system memory	x	o	o	
25	PU TRACE TEST	Trace function check of user system memory	x	o	o	
26	PU CONTINUE TEST	Continuous test of user system memory and emulation memory	x	o	x	(Note 2)
27	CLOCK TRACE TEST	Clock trace mode test	x	o	x	
28	TTL LOOP TEST	Loop test of TTL and HOST interface	x	o*	x	
29	SWITCH TEST	Reset and NMI switch test	x	o*	x	
30	PROB TEST	External probe test	x	o*	x	
31	BREAK KEY TEST	Break test by BREAK key on CRT	x	o*	x	
32	OTHER LINE TEST	BUSTEQ and INT0 to INT2 test	x	o*	x	
33	CRES TEST	Cycle reset trigger test	x	o*	x	(Note 3)
34	TRIG TEST	Trigger output test by trigger mode	x	o*	x	
35	USER RUN TEST	User's firmware RUN test	x	o*	x	
36	NO CLK TEST	User system down detection test	x	o*	x	

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No.	Item	General specification	Execution by test mode		
			ASE ONLY	ASE+FIXED	ASE+FREE
37	PRINTER LOOP TEST	Printer interface loop test	o	<--	<--
38	ASCI0 & CS I/O TEST	ASCI channel loop test and CS I/O test	x	o*	x
39	DREQ 0,1 TEST	DREQ0 and DREQ1 line check	x	o*	x

* : Depending on specification

(Note 1) When option RAM test is specified, Test 14 is executed. In this case Tests 14 to 19 are all available to the option RAM area. For the ASE + FREE USER test, however, Tests 14 to 19 are not executed.

(Note 2) Test 26 is executed on the option RAM area if the option RAM area exists. (As for only ASE + FIXED USER test)

(Note 3) Tests 28 to 36 require operator intervention. They are executed only when ASE + FIXED USER test is selected and the operation is specified. Also, Tests 38 and 39 are executed with the operation specified.

Fig. 9-4 shows the T&M operating flowchart. The test mode is selected just after loading the T&M.

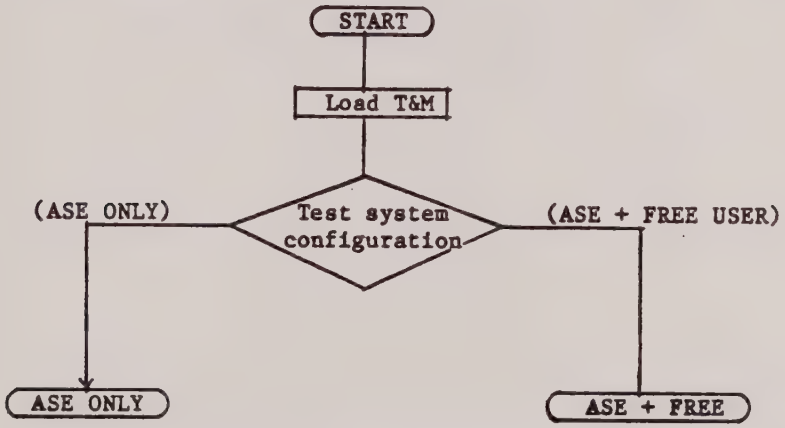

Fig. 9-4 T&M Operating Flowchart

Each branch continues to the following pages.

(In each test mode, Test 37 is executed with the operation specified.)

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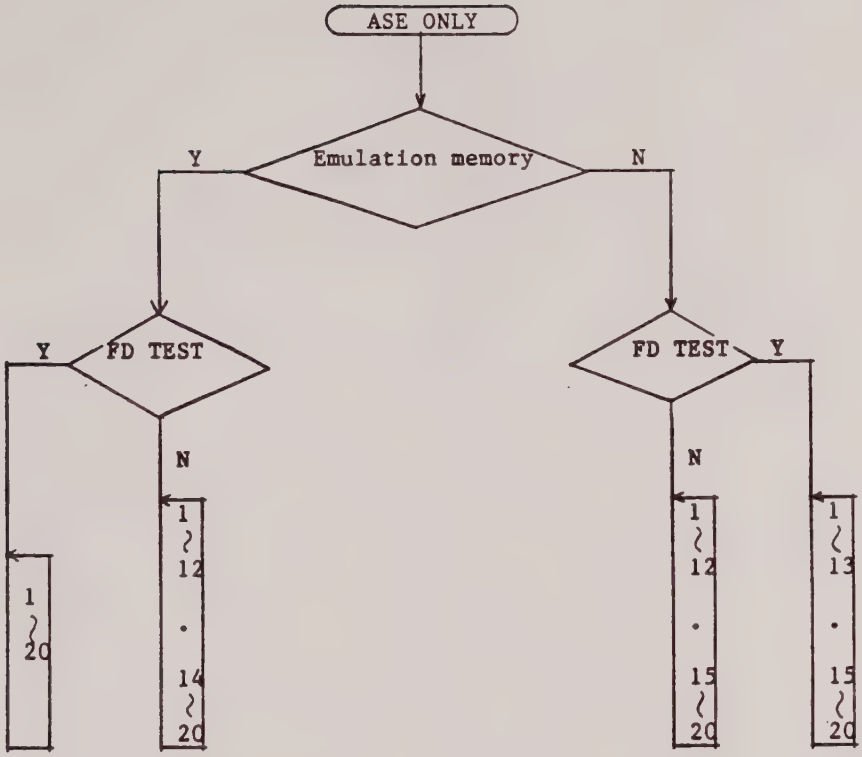

The numbers indicate Test No.

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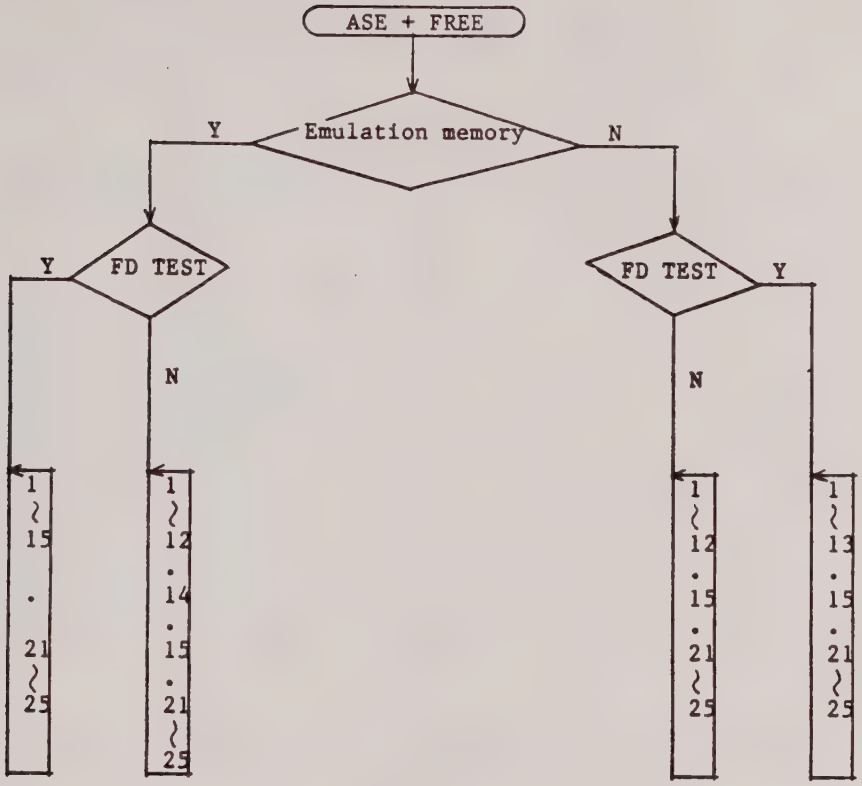

The numbers indicate Test No..

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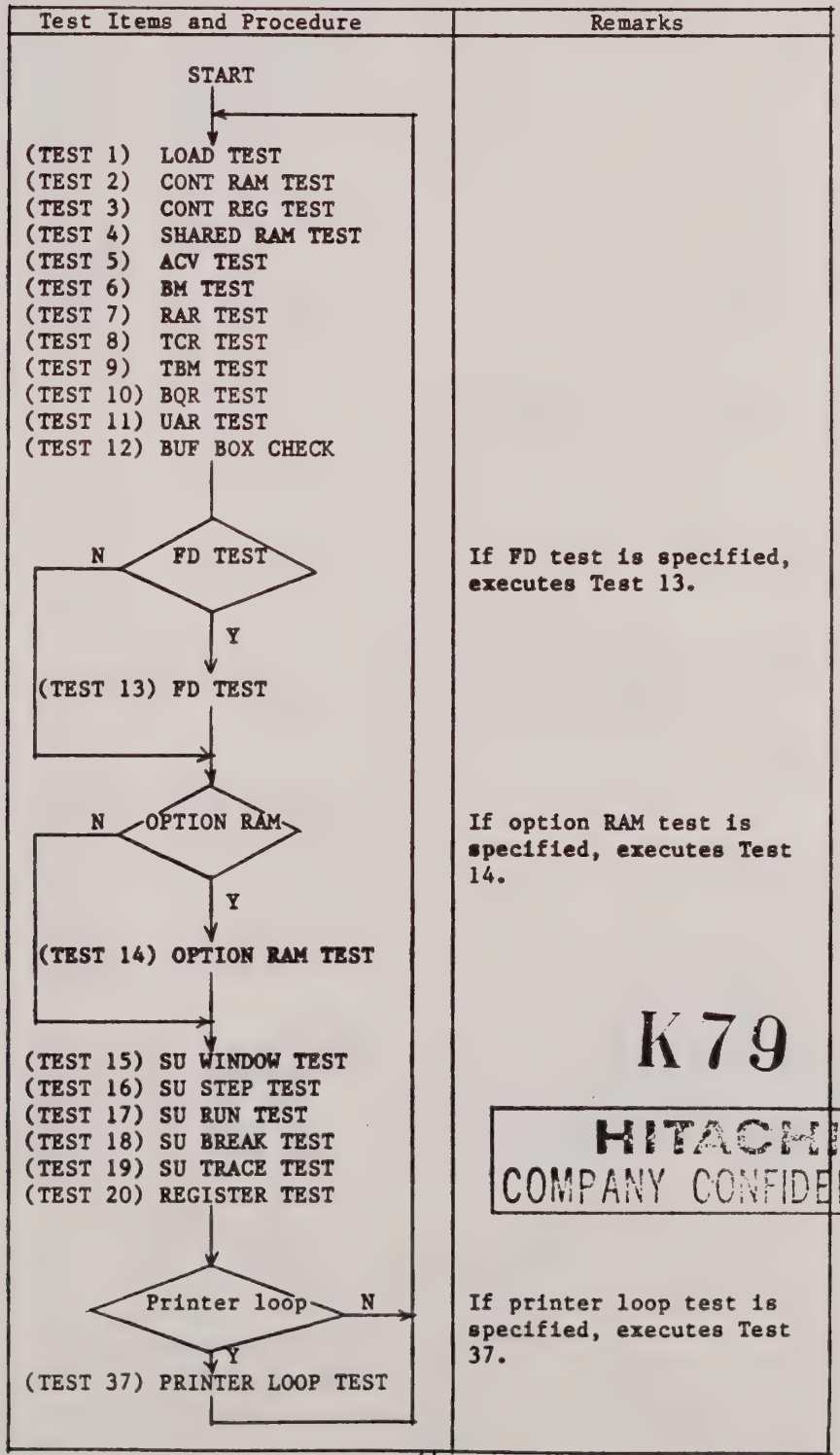
9.3 Test Selection and Test Execution

The test items in each test mode are listed below.

(1) ASE ONLY test

Table 9-2 Test Items (ASE ONLY test)



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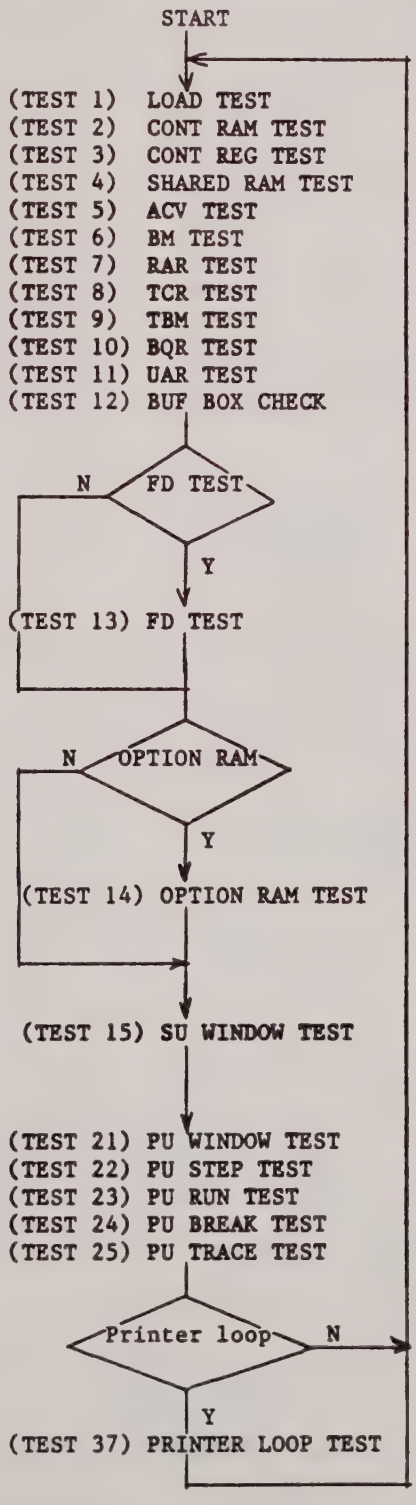
(2) ASE + FREE USER test

Table 9-3 Test Items (ASE + FREE USER test)

Test Items and Procedure	Remarks
	If FD test is specified, executes Test 13. If option RAM is specified, executes Test 14. If printer loop test is specified, executes Test 37.

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9.4 T&M Operating Procedure

The following is the T&M operating procedure.

(1) Connect H180AS01 with CRT and user system. (User system is omissible.)

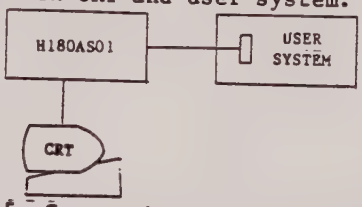

Fig. 9-5 Connecting with CRT and User System

(2) Turn the power ON in the order below.
   (i) CRT
   (ii) User system power supply
   (iii) H180AS01

(3) If H180AS01 is turned ON, it executes diagnostic program and then outputs the following message. Then "R (CR)" is input, T&M is loaded.

```
START ASE
 S : START ASE
 R : RELOAD & START ASE
 H : HOST SYSTEM MODE
     (S/R/H)? R (CR)
```

(4) After loading T&M, the following message is output on the CRT. Then input test mode.

```
H180AS01 TEST AND MAINTENANCE PROGRAM ------- (1)
    VER NO = %rr

PRINTER USING (Y/N)? Y (CR)          ------- (2)
ERROR CONTINUE (Y/N)? N (CR)         ------- (3)

TEST MODE
  1. ASE ONLY
  2. ASE + FIXED USER
  3. ASE + FREE USER

MODE NO. = 1 (CR)                    ------- (4)

OPTION MEMORY EXIST (Y/N)? Y (CR)    ------- (5)

OPTION MEMORY
  TOP ADDRESS = $8*0000? 0 (CR)
  END ADDRESS = $8*FFFF? 3 (CR)      ------- (6)

OPERATION TEST(Y/N)? N (CR)          ------- (7)

FD TEST EXECUTE(Y/N)? Y (CR)         ------- (8)

  1. FD FORMAT                 5. 55 AA R/W
  2. NORMAL SEEK               6. RANDOM DATA R/W
  3. SEEK TRACK ZERO           7. WORST PATTERN R/W
  4. RANDOM SEEK               8. HEATRUN (1-7 CONTINUE)
```

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(to be continued)

```
TEST NO. (1,2,3,4,5,6,7,8) = 123 (CR)    --- (9)
START (Y/N)? Y (CR)                      ------- (10)
```

① T&M main title

② With printer connected, input "Y". If "N" is input, the next question about printer loop test continues.

③ Only when "Y" is input in ②, this line is displayed. To stop the system because of error occurrence, input "N", and to continue the test inspite of error occurrence, input "Y".

④ Select the test mode.

```
  1 : ASE ONLY TEST
 *2 : ASE + FIXED USER TEST
  3 : ASE + FREE USER TEST
```

* DO NOT select this mode, because this is only selected at shipment.

⑤ Input the presence or absence of a high-speed emulation memory.

⑥ Input the addresses below according to the number of high-speed emulation board.

One board : Input "0" and "3".
Two boards : Input "0" and "7".

⑦ If FD test should be executed, input "Y", and if not input "N".

⑧ If "Y" is input in ⑦, this line is displayed. Input the test No. to be executed. As for details of each test, refer to "H180AS01 3.5 inch FD T&M Specification".

⑨ If "Y" is input, the test begins. If "N" is input, the display returns to T&M main title again.

(5) Execute the T&M

If T&M is specified to start, T&M operates according to the flowchart in Fig. 9-4. When the test begins, as far as there are no special errors, the following message is displayed and T&M operates. Tests 28 to 36, 38 and 39 require operator intervention, therefore, the test does not go to the next step without the operation.
The user system must be PC831.

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```
     H180AS01 TEST AND MAINTENANCE PROGRAM
         VER NO.=1.00

     ERROR CONTINUE
     OPTION RAM = $800000 - $83FFFF
 FD TEST = ,,,8
 COUNT 0001 TEST 01  LOAD TEST              OK
 COUNT 0001 TEST 02  CONT RAM TEST
 T&M AREA R/W TEST         OK
 FREE AREA R/W TEST        OK
 ASE STACK AREA R/W TEST   OK
 COUNT 0001 TEST 03  CONT REG TEST          OK
 COUNT 0001 TEST 04  TRACE RAM TEST1        OK
 COUNT 0001 TEST 05  TRACE RAM TEST2        OK
 COUNT 0001 TEST 06  TRACE RAM TEST3        OK
 COUNT 0001 TEST 07  TRACE REG TEST1        OK
 COUNT 0001 TEST 08  TRACE REG TEST2        OK
 COUNT 0001 TEST 09  TRACE RAM TEST4        OK
 COUNT 0001 TEST 10  TRACE REG TEST3        OK
 COUNT 0001 TEST 11  TRACE REG TEST4        OK
 COUNT 0001 TEST 12  BUFBOX CHECK           OK
 COUNT 0001 TEST 13  FD TEST                          ※
     TEST8  3.5 FD HEATRUN TEST
     TEST1  3.5 FD FORMAT TEST                  OK
     TEST2  3.5 FD NORMAL SEEK TEST             OK
     TEST3  3.5 FD SEEK TRACK ZERO TEST         OK
     TEST4  3.5 FD RANDOM SEEK TEST             OK
     TEST5  3.5 FD 55,AA READ/WRITE TEST        OK
     TEST6  3.5 FD RDM DATA READ/WRITE TEST     OK
     TEST7  3.5 FD WORST DATA READ/WRITE TEST   OK
 COUNT 0001 TEST 14  OPTION RAM TEST1                 ※
 OPTION RAM PAUSE TEST    OK
 OPTION RAM MARCH TEST    OK
 BOX RAM CHECK            OK
 CUONT 0001 TEST 15  SERVICE RAM TEST1
 SU SINGLE SEGMENT TEST  OK
 SU ALL SEGMENT TEST     OK
 BU SINGLE SEGMENT TEST  OK
 BU ALL SEGMENT TEST     OK
 COUNT 0001 TEST 16  TRACE TEST1            OK
 COUNT 0001 TEST 17  TRACE TEST2            OK
 COUNT 0001 TEST 18  TRACE TEST3            OK
 COUNT 0001 TEST 19  TRACE TEST4            OK
 COUNT 0001 TEST 20  MPU REGISTER TEST
 MMU R/W TEST                  OK
 I/O RELOCATION TEST           OK
 NON DELAY CYCLE TEST          OK
 SCVR CHECK                    OK
 HALT & SLEEP BREAK TEST       OK
 DMA BREAK TEST                OK
 ASCI TEST                     OK
 AT NO BREAK TEST              OK
 A18/TOUT TEST                 OK
 OPTION RAM DMA TEST           OK
 COUNT 0002 TEST 01  LOAD TEST              OK
 COUNT 0002, TEST 02, CONT RAM TEST,
    (a)       (b)          (c)              (d)
```

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10. ERROR DISPLAY

10.1 Display Format

If an error is detected during the execution of each test, the error is displayed in the following format.

Table 10-1 Display Format

Format	Display	Test No.
1	COUNT xxxx TEST 01 LOAD TEST STATUS = xxxx ---------- Error status ADDRESS = xxxxxx ---------- Address where an error is detected NORMAL DATA = xxxx ---------- Normal value data ERROR DATA = xxxx ---------- Error data If data is accessed by byte, the low-order bytes are displayed by asterisks as follows: xx**	1 to 11 14, 15 17, 18 20, 21 27, 28, 29, 30 32, 34, 36, 38
2	COUNT xxxx TEST 12 BUFBOX CHECK NG STATUS = xxxx ---------- Error status COMMAND = xxxxxxxx xxxxxxxx COMMAND means the commands sent from the control board to the buffer box. The first 8 letters indicate the command type, and the next 8 letters indicate the message size. MESSAGE means the response of the buffer box to the control board. The first 8 characters indicate the return code, the next 8 characters indicate the message size, and the last 8 characters indicate: At ROM error : Checksum value At RAM error : A RAM address where an error is detected. Others : Indefinite	11 to 39
3	COUNT xxxx TEST TRACE TEST 2 NG STATUS = xxxx ---------- Error status RAR = xxxx xxxx STM = xxxx xxxx xxxx xxxx BSR = xxxx xxxx ECR = xxxx xxxx xxxx xxxx xxxx xxxx TBM 1 = xxxx xxxx xxxx xxxx xxxx xxxx TBM 2 = xxxx xxxx xxxx xxxx xxxx xxxx TBM 3 = xxxx xxxx xxxx xxxx xxxx xxxx TBM 4 = xxxx xxxx xxxx xxxx xxxx xxxx (Notes) • As for RAR to TBM 4(except RA11), a half of the display on the left indicates normal value data, and the other half indicates error data. • As for STM, the first four characters on the left indicate SR value, the next four on the right indicate PCH value.	16 to 39

(to be continued)

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Format	Display	Test No.
	• As for ECR, the first word is the high-order word. • As for TBM, the first four characters indicate the final trace value, the next two words indicate the high-order and low-order word of checksum.	
4	COUNT xxxx TEST LOOP TEST LOOP CONNECTOR OK? NG STATUS = xxxx ---------- Error status	11 to 39
5	COUNT xxxx TEST SWITCH TEST NG STATUS = xxxx ---------- Error status NORMAL DATA = xxxxxxxx ------ Normal value data ERROR DATA = xxxxxxxx ------- Error data	31, 39

After displaying an error message, unless a printer is connected and the test is continued inspite of errors, the T&M stops and the ASE goes to command input wait state.

10.2 Error Status

The error status determines and shows the place where the error has probably occurred, according to errors detected by the T&M. The place where the error has occurred is divided as follows.

1000 — -------Control board error
2000 — -------Trace board error
3000 — -------Buffer box error
4000 — -------Option RAM error
5000 — -------User system error

The following shows detailed status information.

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Table 10-2 ASE T&M Error Status (CONT P/I)

Status	Desctiption	Test No.
1001	T&M CHECK SUM ERROR	1
1002	CONT RAM R/W ERROR	2
1003	EMRQ NOT CLEAR	3
1004	MONITOR REG 2 CHECK ERROR	3
1005	CBR R/W ERROR	3
1006	CMPXR R/W ERROR	3
1007	CSTR BERR NOT OCCURRED	3
1008	NO MEM BIT ABNORMAL	3
1009	ECR R/W ERROR	3
100B	MONITOR REG 1 COMPARE ERROR	36
100D	HOST I/F BAUD RATE ERROR	28
100E	HOST I/F PARITY ERROR	28
100F	HOST I/F OVERRUN ERROR	28
1010	HOST I/F FLAMING ERROR	28
1012	MONITOR REGISTER RES BIT ABNORMAL	29
1016	MONITOR REGISTER MREQ BIT ABNORMAL	32
1018	ECR2 COUNT ERROR	34
1019	PRINTER I/F STAUS ERROR	37
101A	PRINTER INTERRRUPT ERROR	37
1101	HOST I/F CHARACTER COMPARE ERROR	28
1020	CONT RAM IMAGE CHECK ERROR	2
1021	CONT ROM CHECK SUM ERROR	1
1022	MONITOR ADDRESS COMPARE ERROR	29

Table 10-3 ASE T&M Error Status (TRACE P/I)

Status	Description	Test No.
2001	SHARED RAM R/W ERROR	4
2002	BREAK MEMORY R/W ERROR	6
2003	ACV R/W ERROR	5
2004	RAR R/W ERROR	7
2005	TCR R/W ERROR	8
2006	TBM R/W ERROR	9
2007	BQR R/W ERROR	10
2009	OPTION RAM WINDOW R/W ERROR	15
200A	OPTION RAM WINDOW ADDRESS ERROR	15
200B	OPTION RAM IMAGE CHECK ERROR	15
200C	TRACE DATA CHECK ERROR	16 to 39
200D	BREAK STATUS ERROR	16 to 39
200E	TAVAIL BIT NOT FOUND	27, 30
200F	AS BIT NOT FOUND	27, 30
2010	AS BIT NOT OFF OVER RAR	27, 30
2011	ADDRESS COUNT COMPARE ERROR	27, 30
2012	DATA COUNT COMPARE ERROR	27, 30
2013	STM COMPARE ERROR	31
2014	PROBE COUNT COMPARE ERROR	30
2015	SHARED RAM IMAGE ERROR	

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Table 10-4 ASE T&M Error Status (BUFBOX P/I)

Status	Description	Test No.
3001	EMRQ TIME OUT	11 to 39
3002	BUFBOX RUN TIME OUT	11 to 39
3003	BUFBOX MESSAGE ERROR	11 to 39
3004	CBR BREAK BIT ABNORMAL	11 to 39
3005	BUFBOX TIME OUT ERROR	11 to 39
3007	WRITE PROTECT ERROR	18
3008	USER RESET LINE ABNORMAL	29
3009	USER NMI LINE ABNORMAL	29
300A	WRITE PROTECT BREAK NOT OCCURRED	29
300B	USER MASREQ LINE ABNORMAL	32
300D	USER SYSTEM RUNNING AFTER POWER OFF	36
3010	USER INT0 LINE ABNORMAL	32
3011	USER INT1 LINE ABNORMAL	32
3012	USER INT2 LINE ABNORMAL	32
3108	REF DISABLE MODE UAR R/W ERROR	11
3208	REF ENABLE MODE UAR R/W ERROR	11
320F	TENDO BREAK NOT OCCURRED	35
32F8	LONG REF CYCLE MODE UAR R/W ERROR	11
3D01	MMU R/W ERROR	20
3D22	I/O RELOCATION ERROR	20
3D23	SCVR CHECK ERROR	20
3D25	DMA MEMORY R/W ERROR	18
3D26	DMA MEMORY IMAGE ERROR	18
3D2A	ASCI CH0 BREAK STATUS ERROR	38
3D2B	CS I/O BREAK STATUS ERROR	38
3E01	ABNORMAL USER INTERRUPT LINE	32
3FF1	BUFBOX DMA BREAK PC ERROR	39
3D27	DMA WRITE PROTECT ERROR	20
3D28	SLEEP TIME OUT NOT OCCURRED	29

Table 10-5 ASE T&M Error Status (OPTION RAM)

Status	Desctiption	Test No.
4001	NO MEMORY AREA BUS ERROR NOT OCCRED	14
4002	OPTION RAM R/W ERROR	14
4401	WINDOW PARITY CHECK ERROR	1
4402	STEP PARITY CHECK ERROR	2
4403	RUN PARITY CHECK ERROR	3

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Table 10-6 ASE T&M Error Status (USER)

Status	Desctiption	Test No.
5001	USER RAM R/W ERROR	21
5002	USER RESET NOT CLEAR	29
5003	USER MASREQ NOT CLEAR	32

10.3 Commands at Error Occurrence

In the T&M, when an error occurs and the test stops, the user can get the information in the ASE by inputting some simple commands for easy debugging.
Below are listed the command and its description.

Table 10-7 Commands at Error Occurrence

Command	Command syntax	Description
TM	>TM ↵	Returns the T&M to the initial state.
PR	>PR␣;E ↵	Brings the printer to enable state.
	>PR␣:D ↵	Brings the printer to disable state.
ERR	>ERR ↵	Displays error status. (Note 1)
	>ERR␣;D ↵	Prevents from command input at error occurrence.
MD	>MD␣ADR1␣ADR2[:U] ↵	Displays the contents of ADR1 to ADR2, when ADR1 < ADR2. Displays the contents of ADR1 to ADR1 + ADR2 when ADR1 > ADR2. Option "U", which is omissible, is used for memory dump of user memory area.
M	>M␣ADR[;U] ↵	Modifies the contents of address shown by "ADR". The contens are not modified by inputting only "↵". Read the following address data and wait for input. • Inputting ".↵" returns the T&M to command input wait state. • Inputting "^↵" decrements the address. Option "U", which is omissible, is used for modifying user memory. The command should be used by word unit.
TBM	>TBM[␣RAR1␣RAR2;E] ↵	Displays the contents of TBM. When "E" option is specified, displays the contents of TBM of RAR1 to RAR2. As for the display format, refer to the attached figure 4.
ACV	>ACV␣ADR1[␣ADR2] ↵	If ADR2 is omitted, displays the converted value of the physical address corresponding to the logical address shown as ADR1. If ADR2 is specified, sets the logical address shown as ADR1 to the physical address of ADR2.
CLK	>CLK ↵	Displays the set clock mode.
	>CLK␣;6 ↵	Sets the clock mode to ASE 6MHz.
	>CLK␣;U ↵	Sets the clock mode to USER clock.
	This command is effective to input RESET to the buffer box.	
EM	>EM ↵	Displays whether or not EMRQ is issued from the buffer box.
	>EM␣;D ↵	Negates EMOK.
	>EM␣;E ↵	Issues a command currently in a command packet.

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(to be continued)

Command	Command syntax	Description
	>EM␣;O ↵	Issues sequentially a command currently in a command packet.
ASE	>ASE ↵	Passes control to the ASE firmware.
BANK	>BANK ↵	Displays a trace bank currently set.
TEST	>TEST n;D ↵	Prevents Test No. n from being executed.
	>TEST n;E ↵	Bring Test No. n to be executed.
	>TEST n;O ↵	Bring only Test No. n to be executed.
RTN	>RTN ↵	Continues the test next to the test where an error occurs.
GO	>GO␣ADR ↵	Passes the MPU control on the CP side to a program by addresses shown as "ADR".
MAP	>MAP ↵	Displays the contents of MCR currently set.
	>MAP␣ADR1␣ADR2;U ↵	Sets memory attributes. Example on the left means ADR1 to ADR2 area is assigned to the user memory.

0 : BUO MEMORY
1 : BU1 MEMORY
OR : BUO READ ONLY MEMORY
1R : BU1 READ ONLY MEMORY
S : OPTION MEMORY
SR : OPTION READ ONLY MEMORY
U : USER MEMORY
UR : USER READ ONLY MEMORY

(Note 1) If an error occurs and T&M is in command input wait state. when the BREAK key is pressed or a bus error occurs, the error status will disappear.

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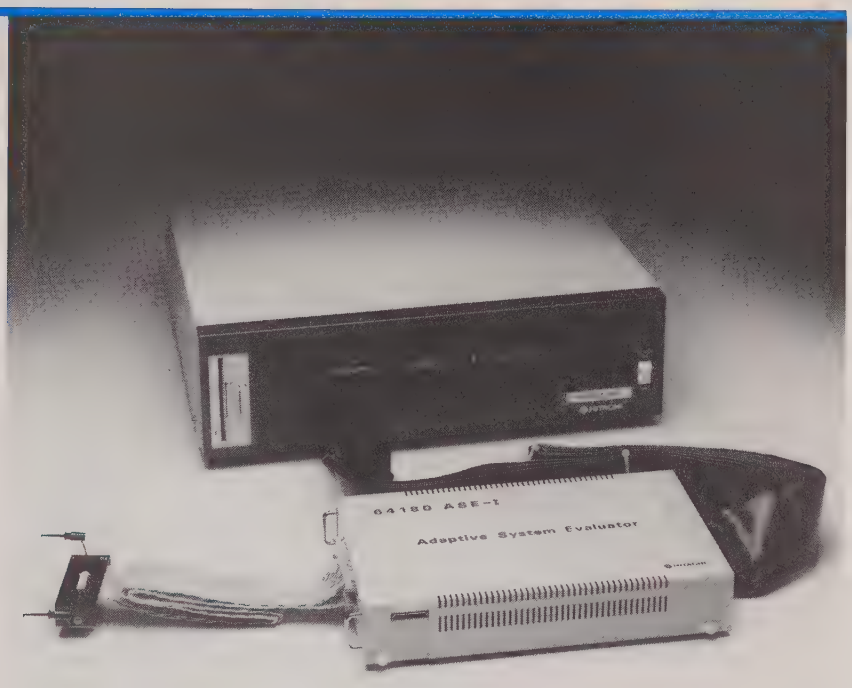
AUGUST, 1985

H180AS01

HD64180 Emulator

Adaptive System Evaluator (ASE)



The Adaptive System Evaluator (ASE) is a real-time in-circuit emulator to support the development of systems based upon the HD64180 8-Bit CMOS Microprocessor.

The HD64180 is a high-speed CPU that is object-code compatible with Z80*/8080* families, and integrates on-chip peripheral functions such as a Memory Management Unit (MMU), 2-channel Direct Memory Access Controller (DMAC), 2-channel Programmable Reload Timer (PRT), 2-channel Asynchronous Serial Communication Interface (ASCI), and a Clocked Serial I/O Port (CSI/O). Because of these features, the HD64180 is targeted for system applications requiring high performance. The ASE emulator is a powerful debugging tool designed to meet demanding system development requirements.

The ASE operates stand-alone with a display terminal and connects serially with a standard development host (i.e.: IBM-PC*, DEC VAX*) to provide a complete development and debug environment for HD64180 designs.

FEATURES

- **Stand-alone in-circuit emulator with serial interface to standard development hosts (IBM-PC*, VAX*, etc.).**
  -PC Link software available.
  -VAX interface through standard VAX download commands.
- **Use Z80* or HD64180 assemblers, compilers for program development on host.**
  -Additional HD64180 instructions available in macro code for Z80* assemblers.
  -HD64180 PASCAL and C compilers available.
- **Real-time emulation.**
  -6.144 MHz (higher speeds available in 1986, i.e.: 8 MHz).
- **Real-time trace.**
  -2K x 52-bit trace buffer.
  -Unique high-speed trace mode.
- **Pulse trigger output.**
- **Expandable up to 512K bytes of emulation RAM.**
  -8K byte emulation RAM standard.
  -256K byte emulation RAM board optional—two boards max. (H680SM01S).
- **Set and modify breakpoints.**
  -Software (255 max.).
  -Hardware (2 max.).
- **Single-line assembler/ disassembler.**
- **Symbolic debugging.**
- **Single-step execution.**
- **3.5-inch floppy disk drive loads and saves user programs.**
- **Two serial ports for communication with host and terminal.**
- **Printer port for hard copy logging of the debug session.**

FUNCTIONAL DESCRIPTION

Function	Description
Real-Time Emulation	■ Real-time emulation at 6.144 MHz, (0.5 to 6.144 MHz with external clock). -Emulation until the software or hardware break conditions are satisfied or until the break key is entered.
	■ Trigger output synchronized for an oscilloscope. -Pulse output under hardware break conditions when using TRIG output pin on the ASE station front panel as a synchronized signal for an oscilloscope.
	■ Cycle reset mode. -Resets CPU in user programmable intervals.
Hardware and Software Breakpoints	■ Hardware break condition setting. The following conditions can be specified to force an emulation stop (2 breakpoints max.): -Program counter. -Address bus, data bus. -External signal (eight probes). -Transfer end (TEND) signal. -Range of program counter or address. -Loop counter (1024 max.). -Combination of conditions.
	■ Software break condition setting. -Sets breakpoints in the program RAM area (255 breakpoints max.).
Trace Display with Real-Time Emulation (2048 x 52- Bits)	■ Trace display data. -Logical address. -Disassembled instruction. -Address/data bus. -Read/write signals. -ME and IOE signals. -Interrupt signals. -Reset signal. -DREQ and TEND signals. -External signals (eight probes).
	■ Trace trigger conditions. -Address (logical address, physical address). -Data access. -External signal (eight probes). -Transfer end (TEND) signal. -Specification of (PC or address) range. -Loop counter (1024 max.). -Combination of conditions.
	■ High speed trace (125ns capture rate).
Single-Step Execution	■ Emulation with a display of the following information every single step: -Disassembled instruction. -Contents of registers.
	■ Emulation with a display of the information mentioned above for branch instructions only.
	■ Stop-condition setting. -Program counter. -Address bus, data bus. -Contents of registers. -Contents of memory.

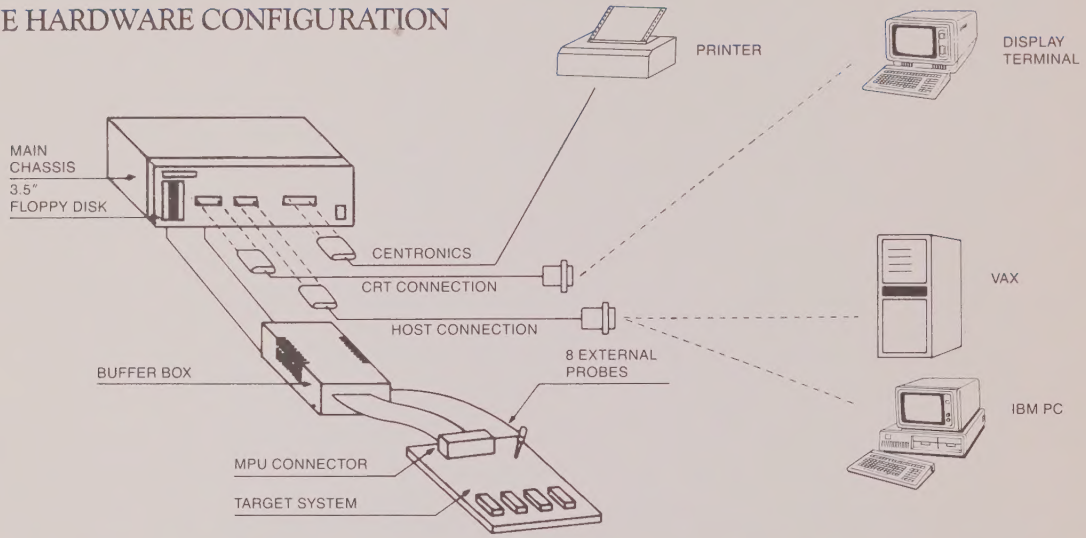
Function	Description
Interface to Standard Development Hosts	■ Object format. -Motorola S format. -Intel HEX format. ■ Hardware specification. -RS232C port. ■ Software interface. -X-ON, X-OFF control. -CTS, RTS control.
Memory Access	■ Display and modification of the contents of memory. -Display and modification of the contents of memory space and I/O space. ■ Specification of memory attributes in 4K byte (only for memory space). -User system memory. -Write-protect feature. -Emulation memory.
Emulation Memory	■ 8K byte provided for standard version. ■ Expandable up to 512K byte of emulation RAM using optional 256K byte memory board—2 max. (H680SM01S).
Single-Line Assembler	■ Assemble mnemonic instruction and set memory.
Disassembler	■ Disassemble contents of memory at the specified address and display the mnemonic instruction.
Load, Save, and Verify the User Program	■ Load, save, and verify the user program with the 3.5-inch floppy disk in the ASE station. ■ Load, save, and verify the user program with a file in the host development system.
MPU Signal Control and State Checks	■ Enable/disable external interrupt signal. -$\overline{\text{NMI}}$. -$\overline{\text{INT0}}$-$\overline{\text{INT2}}$. ■ Checks the MPU I/O signal. -Checks malfunction, such as short circuit, for each MPU signal.
Real-Time Measurement	■ After user program execution with GO command, measures the execution time until the end. -Maximum possible measuring time = 2^{45} μs (approx. 1 year).
Coverage Trace	■ Traces the addresses that the MPU accessed during user program execution.
Miscellaneous	■ Figure conversion. -Binary, octal, decimal, hexadecimal conversion, ASCII display. -Logical address, physical address conversion.

*Z80, 8080, IBM-PC, and DEC VAX are registered trademarks of Zilog Inc., Intel Corporation, International Business Machines Corporation, and Digital Equipment Corporation, respectively.

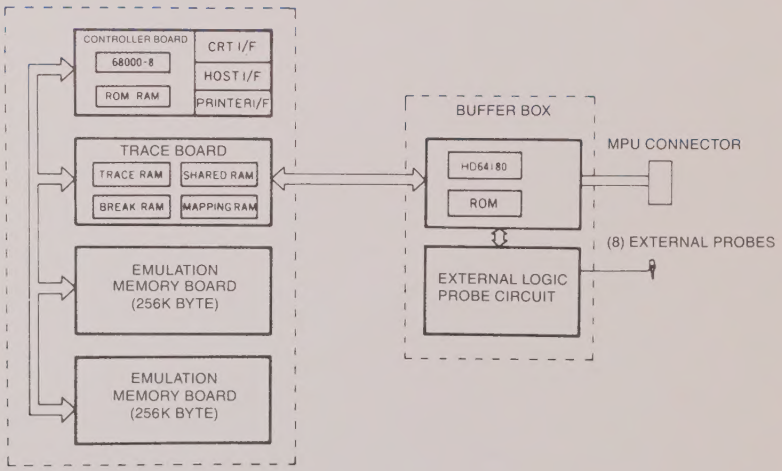
HARDWARE DESCRIPTION

The ASE consists of the ASE station, the buffer box, the user system interface cable, and eight external probes. The ASE station is connected to the host development system and to the CRT display through either of the two RS232C ports. A printer can be connected to the Centronics Port.

ASE HARDWARE CONFIGURATION



HARDWARE BLOCK DIAGRAM



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